



# Feedback on the **National Infrastructure Assessment**

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Building the Canada We Want in 2050

# Introduction

## About CanBIM

Founded in 2007, CanBIM represents over 1100 members from the Architecture, Engineering, Construction and Owner Operators (AECOO) industry across Canada and has ties to over 24 international associations through strategic partnerships. CanBIM's purpose and mission is to advance civilization and improve the built environment we inhabit through the adoption of innovative technologies and processes. CanBIM has built a robust community of industry-leading practitioners who are proactively engaged in the effective deployment of digital technologies and processes across all building and infrastructure disciplines. To act on our mission and vision, CanBIM focuses on four strategies.

- **Leadership:** By organizing Canada's largest building and infrastructure community to achieve a common goal of widespread and consistent use of digital technologies and processes in Canada.
- **Advocacy:** By using our Industry Think Tanks and various platforms to drive the development of best practices, scopes of work, guidelines, and document standardization.
- **Education:** By facilitating and fostering a closer relationship between educational institutions and the building and infrastructure industry through innovative learning opportunities and initiatives.
- **Engagement:** By reaching out to industry leaders, speaking on behalf of our members and engaging a broader community directly in debate and initiatives around the Canadian digital transformation and adoption of new technologies and processes.

## Purpose

The Government of Canada is seeking feedback on three areas of its National Infrastructure Assessment:

1. Assess Canada's infrastructure needs and establishing a long-term vision
2. Improve coordination among infrastructure owners and funders
3. Determine the best ways to fund and finance infrastructure

Since our inception in 2007, CanBIM has been working hard on these three areas and our membership has been intimately involved in building and facilitating infrastructure projects, promoting coordination and collaboration between the public and private sector, and creating solutions to advance the industry to produce and fund better and more efficient infrastructure projects. The following sections provide some specific steps that we feel are critical to Building the Canada We Want in 2050.

## Organizational goals

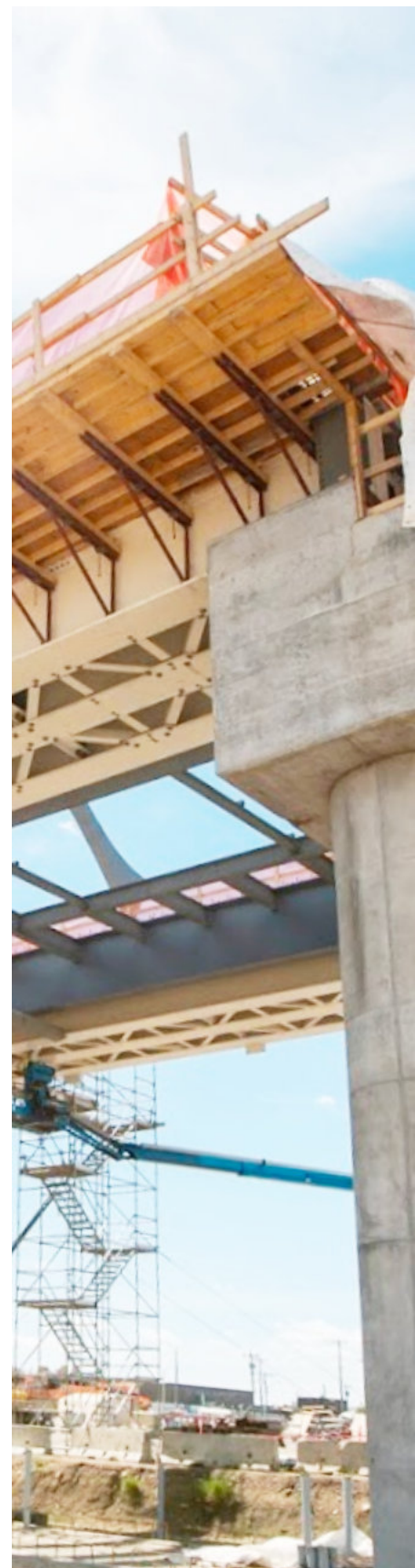
Our Purpose is to advance our civilization by driving the Canadian AECOO industry to be global leaders in innovation and technology. To do this, CanBIM has six operational goals that help implement the strategy.

1. CanBIM will host events where our CanBIM members and industry leaders will discuss and decide upon key issues relating to digital technologies and processes.
2. CanBIM will grow the membership and professional affiliations for the purpose of fostering collaboration, communication, and community.
3. CanBIM will create opportunities to showcase the innovative work of our members, establishing and recognizing our members as innovative global leaders.
4. CanBIM will deliver a certification benchmark for assessing professionals, companies, and educational curriculum against nationally standardized and recognized levels of BIM, virtual design and construction, digital project delivery and competency and process management skills.
5. CanBIM will actively engage and foster opportunities within the academic and research community to ensure future generations of professionals develop new skills, strong networks and opportunities to accrue knowledge through research opportunities.
6. CanBIM will work toward unifying and engaging Canadian associations, councils, and organizations that advocate for the use of digital technologies and processes within the building and infrastructure industry.

# Assess Canada's infrastructure needs & establish along-term vision

## A Infrastructure digitization strategy (standards for reporting data)

The Government of Canada can help facilitate a roadmap to identify needs and establish a long-term vision by creating an infrastructure digitization strategy. This roadmap should be facilitated by Infrastructure Canada in partnership with the private and public sector and lead to a strategy to create a digital twin of infrastructure of the future, and a standard method to report and share information throughout the industry. This roadmap will help Canadian companies “digitize” their supply chain and allow for better infrastructure management and optimized facility management, in turn benefiting the triple bottom line by increasing productivity and safety and minimizing waste through a digital built environment. To do this, the Government of Canada should start with public infrastructure by supporting infrastructure owners regionally, provincially, and locally through the standardization of digital files through procurement, data collection methods and data management practices. Nationally, there is a need for a holistic approach to report on the state of infrastructure. However, there is a need for improved coordination between the public and private sectors and more knowledge sharing is required to ensure all stakeholders can communicate their needs in a consistent format. This can be accomplished by **establishing an infrastructure digitizing roadmap and standards at the federal level.**



## B Canadian net-zero roadmap

The vision of net-zero by 2050 can be achieved through a net-zero roadmap that leverages the digital economy to build greener. This can be done by incentivizing owners, developers and operators to encourage lifecycle management costing through procurement, which highlight the benefits of greener methods of construction (e.g., processes like offsite construction, materials such as mass timber, electrifying public transit fleets, etc.) Further stakeholder and public engagement is required to meet the nation's zero emission goals by 2050, and this can start by the Government of Canada leading by example and establishing a process in that **all public infrastructure projects must include a lifecycle analysis including financial impacts over a 50+ year planning horizon and embodied carbon analysis through the use of Building Information Modelling (BIM).**



## C Facilitate collaboration between academia and private industry

The key to establishing the current and long-term vision needs in Canada is innovation that has a line-of-sight on the long-term future of the country. The Government of Canada can influence and incentivize innovation by fostering an environment for private sector and academic collaboration. Studies performed by the International Council for Research and Innovation in Building and Construction among many others have shown that investment in research and development in the construction industry lags compared to ICT, manufacturing, etc. A method to incentivize innovation is using procurement to encourage the private sector to invest in Canadian academic institutions - a method to incentivize the triple helix model. This can be done by enforcing a percentage of public projects to be invested in research and development in partnership with Canadian academic institutions and scoring the respondents based on two factors:

1. **Plan for investment in research and development.**
2. **Plan for knowledge sharing across the industry.**

## D Address the labour shortage of the present and future

Canada is facing a major labour shortage, particularly in the construction industry, and this will continue to worsen for the foreseeable future. This presents both a threat and opportunity for the Government of Canada. The Government of Canada can help close the gap by encouraging young persons to enter skilled trades and creating a national plan to train and encourage immigrants with these skill sets to immigrate to Canada. Similar to recommendation 1c), this can be achieved in partnership with Canadian academic institutions at both the secondary and post-secondary level. Not only will promoting collaboration between academic and private organizations foster better workers, but it will prepare the workforce for the future by identifying current technology trends, training young people on new technologies (i.e., virtual, mixed and augmented reality, robotics, exoskeletons, drones, etc.), and exposing individuals at a young age to career options in the industry. All that said, due to ever widening dependency ratios, even with all of the programs that we can create to attract people into our industry, we are experiencing peak labour. We will never have as many skilled workers as we have today. If the government can find creative ways to fund the much-needed infrastructure projects across Canada, the industry in its current form simply cannot deliver it with our existing and shrinking workforce. We must have concurrent strategies to both continue to maintain our workforce and augment it with automation. With strategic investments in the development of robotics, off-site modularization and global supply chain management, we can create the new methods required to meet Canada's needs while reducing costs and creating exportable intellectual property. The Government of Canada can promote this hybrid approach by **creating a campaign focused on advancing and promoting the AECOO industry followed by the creation of task groups at all levels of academic institutions and private sectors to create a national strategy.**



# E Grow the country's innovation economy through the construction sector

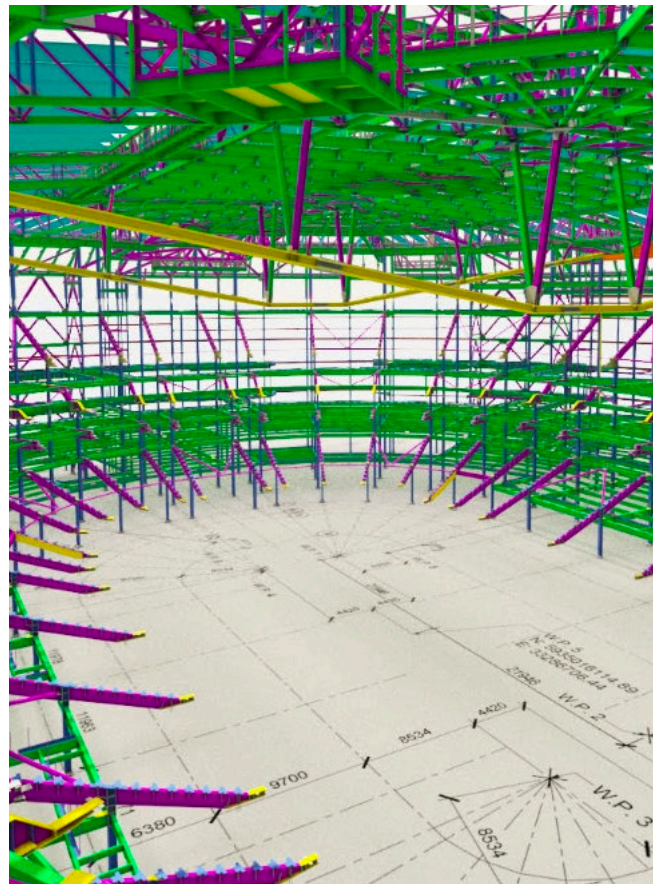
The industry is currently in the middle of major technological transformation. New technologies are being made available which are reshaping the way the industry operates. Companies are becoming increasingly reliant on third-party technology platforms to operate daily and to remain competitive.

More often than not, these technologies are being developed outside of Canada and sold into the Canadian market. This often requires Canadian companies to pay transaction costs or a percentage of their total revenue as a fee to use these proprietary platforms. Notwithstanding, the use of these technologies are enhancing the way the industry works, and creating enormous value by increasing efficiencies and productivity. Thus, it is critical that Canada participates in this emerging global economic opportunity.

The Government of Canada must play a role in supporting the development of Canadian technology startups that are servicing the AECOO industry. This will lead to job creation, a broader tax base and, most importantly, allow Canada to maintain control of intellectual property and retain the associated economic benefits.

The Government of Canada can champion our own Industry 4.0 in the Canadian construction sector through two strategies:

- 1. Infrastructure procurement that incentivizes the use of Canadian design and construction technologies during the procurement process.**
- 2. Creating tax rebate programs for small and medium-sized construction companies that are investing in technologies.**



## Improve coordination among infrastructure owners & funders

### A National BIM mandate

For any items to be achieved in our response to the National Infrastructure Assessment, it is essential for the Government of Canada to adopt a national BIM Mandate. Not only will this help improve coordination between owners and funders, but it will achieve increased coordination across the construction supply chain and help Canada realize the benefits that many other countries are already receiving through digital technologies.

Nearly a decade ago, the United Kingdom commenced their government-industry BIM program which focused on the adoption of BIM technologies. Both public and private sector organizations involved in procurement of buildings and infrastructure realized the benefits of BIM and began mandating it in their projects. The drivers for BIM adoption included:

- **Reducing asset costs and increasing operational efficiency.**
- **Facilitating greater efficiency and effectiveness of construction supply chains.**
- **Assisting in the creation of a forward-thinking sector on which we can base our growth ambitions.**

Over the past decade, the United Kingdom (and several other countries) have begun their transition to ISO 19650. ISO 19650 is a series of international standards that define the collaborative processes for effective management of information related to capital project delivery and operational phases of assets when using BIM. The ISO 19650 series enables teams to minimize wasteful activities and increase predictability around cost and time, which is achieved through a common approach to the management of information

As of May 25, 2021, the Centre for Digital Built Britain (CDBB) has pledged to work with the US National Institute of Building Services (NIBS) on the development of a national BIM program for the US. The memorandum of understanding will see NIBS work with CDBB to adapt the UK BIM program model and materials as a guide to developing a US national roadmap aligned with ISO 19650 (BIM+, 2021). **The Government of Canada needs to recognize the achievements by its peers and look at adopting and implementing a national BIM mandate in collaboration with private industry.**

## B Alignment across owner operators

The Government of Canada can promote collaboration between owners and funders by encouraging the use of collaborative procurement models and demonstrating the benefits of lifecycle planning during the conceptual design of projects. Historically, major capital projects have received funding for the initial capital phase of the project, but with the exception of some large private-public-partnerships (P3 or PPP) projects, rarely have energy performance incentives and operational costs been included in the procurement process of infrastructure. Encouraging funders and owner operators to consider all phases of the built environment's lifecycle from the on-set of a project would lead to better collaboration throughout the supply chain, lower lifecycle costs of infrastructure, lower emissions, less material waste and increased safety. The Government of Canada should facilitate this by **leading an Integrated Project Delivery (IPD) procurement approach that brings together all involved stakeholders from the beginning of the project and encourages the development of a digital twin.**

## C Closing the knowledge gap among infrastructure owners

Coordination between owners and funders is often dependent on the knowledge, resources, and technical abilities of the owner operators. Whether it be small or medium size municipalities, remote or northern communities, or Indigenous communities, the ability for innovative and technological advancements are rarely at the same level as the large urban centres. Given the requirements for affordable housing, job creation, and the social and cultural imperatives through the delivery of infrastructure, it is important for funders and owners to understand the resources and abilities of the persons who will own, operate and maintain the infrastructure. The Government of Canada can fill this knowledge gap by ensuring that owners have the skill sets and resources available to maintain and operate their infrastructure. The Government of Canada can do this by **partnering with the private sector and not-for-profit organizations to create tools and training programs focused around digital technology adoption and best practices for training, maintaining and operating large portfolios of infrastructure.**



## Determining the best ways to fund & finance infrastructure

### A Focus on lifecycle analysis from the beginning

As mentioned throughout this response to the National Infrastructure Assessment, it is crucial that the Government of Canada leads a procurement method that heavily weights the lifecycle cost and environmental impact of infrastructure over a minimum 50-year planning horizon. Incentivizing performance over the lifecycle will force competing proponents to think of innovative solutions, which is critical at the early stages of the design process. For example, using building materials that cost more in the capital phase of the project, but lead to decreased operation and maintenance costs throughout the lifecycle. The topic of planning beyond the capital project has been discussed throughout the AECOO industry however, budgeting and scheduling constraints often lead to the “lowest price wins” procurement method. With the emergence of digital technologies, and Industry 4.0, the industry is at a point where proper lifecycle planning and analysis can be performed, but this begins with owners and the public sector. The Government of Canada should lead this approach by **mandating that all public infrastructure project proposals complete a benefit-cost analysis that considers the long-term impact of the asset’s lifecycle from an economic, environmental and societal perspective.**

### B Enable private sector financing

Historically, infrastructure is funded through public taxes and fees, which has led to a shortfall in funding for infrastructure and created a major backlog in infrastructure needs (roads, potable water, hospitals, schools, affordable housing, etc.) A method to correct the backlog and build the infrastructure Canada needs now, and in the future, is by enabling private sector financing through alternative procurement models. Where infrastructure projects costs are of minimum \$50 million, we have seen design-build-finance private-public partnerships be a solution to building the infrastructure the country needs. However, this has rarely been a solution as a small percentage of projects exceed these costs therefore are not a logical method of private investment. The Government of Canada should **pursue a strategy to leverage private sector investment in order to meet the infrastructure backlog and Build the Canada We Want in 2050.**

# Conclusion

CanBIM has provided ten (10) solutions to help “Build the Canada We Want in 2050” with the common denominator of building a digital national economy led by the Government of Canada:

## 01

Assess Canada’s infrastructure needs and establish a long-term vision

- a. Infrastructure digitization strategy (standards for reporting data)**
- b. Net-zero roadmap**
- c. Facilitate collaboration between academia and private industry**
- d. Address the labour shortage of the present and future**
- e. Grow the country's innovation economy through the construction sector.**

## 02

Improve coordination among infrastructure owners and funders

- a. National BIM mandate**
- b. Alignment across owner operators**
- c. Closing the knowledge gap among infrastructure owners**

## 03

Determining the best ways to fund and finance infrastructure

- a. Focus on lifecycle analysis from the beginning**
- b. Enable private sector financing**

CanBIM represents over 1100 Architecture, Engineering, Construction, and Owner Operators in the construction industry across Canada, and is the largest multi-disciplinary not-for-profit organization focussed exclusively on innovation and technology for the entire building lifecycle. On behalf of our members, we would like to thank the Government of Canada for the opportunity to provide feedback on the National Infrastructure Assessment and look forward to discussing the best solutions to Build the Canada We Want in 2050.

CanBIM maintains a network of 14 national Think Tanks focussed on various areas of industry processes and best practices. These groups are focussed on understanding the challenges with the current operations as an industry and re-envisioning how we could operate in the future. The Think Tanks represent a geographical, professional and culturally diverse range of innovative technology leaders. These leaders range from small to large private organizations, public organizations, and government agencies working as volunteers to improve our industry and therefore improve civilization. This document was prepared by Brandon Searle, CanBIM Board of Director, Thomas Strong, CEO, President and Founding Member of CanBIM, and Gerry Lattmann, CanBIM Executive Director, in conjunction with CanBIM members, our Board of Directors and our Think Tank leaders, as follows.

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