



Closing the Infrastructure Gap Ontario Regional Analysis

January 2024

Prepared by:





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1.0 Executive Summary

1.1 Report Purpose

This report aims to provide up-to-date construction industry intelligence to support the first budget request for “Closing the Infrastructure Gap by 2030” by the Chiefs of Ontario. Funding is essential for the Chiefs of Ontario and First Nations to plan and implement asset improvements and raise their standard of living to that of the general population of Canada. This report outlines the capital and operations and maintenance (O&M) costs associated with taking major steps to create, repair and improve First Nations infrastructure in Ontario, and to ensure that it is properly maintained. It not only outlines the cost of remedying current shortfalls but looks to a future of population growth and an end to overcrowding and sub-standard living conditions.

This report could not have been prepared without its basis in the previous reports commissioned by AFN or the Chiefs of Ontario on housing, schools and infrastructure, the latter covering a broad range of facilities, such as wastewater, site servicing and emergency services. BTY Group is indebted to the authors of these reports for their participation in this study and to AFN and ISC for their invaluable input and guidance.

While a great deal of effort has been expended in deriving the proposed budgets presented below, it should be recognized that the issues facing First Nations on reserve are complex and multi-faceted. Every effort has been made to use the best information available, but future updates will be required as further research and study reveals, in greater detail, the emerging needs of First Nations in Ontario.

1.2 Project Background

The Assembly of First Nations and Indigenous Services Canada co-developed a report to quantify the capital and operating costs to “Close the Infrastructure Gap by 2030” (CTIG 2030). The funding required to Close the Infrastructure Gap by 2030 represents a critical step towards urgently needed economic reconciliation between First Nations and the governments of Ontario and Canada..

Limited access to essential infrastructure including housing, education, healthcare, connectivity, and other capital buildings and services across First Nations communities has resulted in long-standing intergenerational inequalities compared to the social infrastructure services that are regularly and consistently provided to most Canadians.

The investments called for in this proposal are supported by extensive AFN technical studies which comprise decades of national data, including:

- AFN Report: Cost Analysis of Current Housing Gaps and Future Housing Needs in First Nations
- AFN National First Nations Assets Needs Study
- AFN First Nations Education Infrastructure Capital Needs Assessment
- AFN First Nations Education Infrastructure Operation and Maintenance Needs Assessment

This report focuses specifically on the Ontario need identified in the above reports.

The AFN led a team of industry experts to utilize this research and expand upon it to determine the federal investments needed to Close the Infrastructure Gap by 2030. The AFN detailed the investment required in the November 2022 report titled *“Closing the Infrastructure Gap By 2030 – A Collaborative and Comprehensive Cost Report Identifying the Infrastructure Investment Needs of First Nations in Canada”*.



2.0 Introduction

2.1 Report Objectives

The CTIG 2030 Report identifies, defines, and quantifies the costs associated with implementing major improvements to living conditions on reserves across Canada. The current report isolates the associated scope and costs specific to the Province of Ontario for all asset classes contemplated in the CTIG 2030 Report. The associated costs include, but are not limited to, new investment in a wide range of capital and O&M investment needs.

Realizing the objectives of this report would bring the Province of Ontario closer to achieving First Nations resiliency and sustainability and would provide First Nations peoples in the region with improved access to essential community infrastructure and services. The Report also discusses the impact of implementing this program within the context of the Ontario economy and the capacity of its construction industry.

2.2 Project Team

In addition to BTY Group, the following team members participated in or provided key information in the development of the CTIG 2030 Report, which formed the basis of the current report:

- Assembly of First Nations (“AFN”)
- Indigenous Services Canada (“ISC”)
- Associated Engineering (“AE”)
- First Nations Engineering Services Ltd. (“FNESL”)
- Institute of Fiscal Studies and Democracy (“IFSD”)
- Planetworks (“Planetworks”)



3.0 Methodology

3.1 General Approach

The purpose of the current report is to extract and distill the Ontario results of the CTIG 2030 Report to assist the Chiefs of Ontario in their advocacy work. As such, it reflects the same methodology, source data and analysis used in the CTIG 2030 Report.

The following reports, previously prepared for AFN by its consultants, made key contributions to the CTIG 2030 Report, and subsequently this report:

- AFN – Cost Analysis of Current Housing Gaps and Future Housing Needs in First Nations, 2021, IFSD
- AFN – First Nations Education Infrastructure Capital Needs Assessment 2021, FNESL
- AFN – First Nations Education Infrastructure Operations and Maintenance Needs Assessment, 2022, FNESL
- AFN – National First Nations Asset Needs Study, 2022, AE
- AFN – First Nations On-Reserve Housing and Related Infrastructure Needs, July 2020, FNIGC (reference only).

Refer to the CTIG 2030 Report for a detailed description of the methodology for all asset classes.

This review, in the first instance, aims to provide an estimate of the Capital and Operations and Maintenance costs prepared by other team members. The estimated costs and scope of work inherent in them for Asset replacement, sustainment, growth, and upgrades across Canada have formed the basis of this analysis and verification.

In the instances where granular data were unavailable to allow a comprehensive analysis, appropriate uplifts have been applied to existing summary cost tables (provided to BTY) to ensure they include contingencies and soft costs and reflect changes in the market since the time of pricing by others and cost increases forecast to occur in future years. We note that numbers in the tables throughout this report may not sum to the total due to rounding.

3.2 Definitions

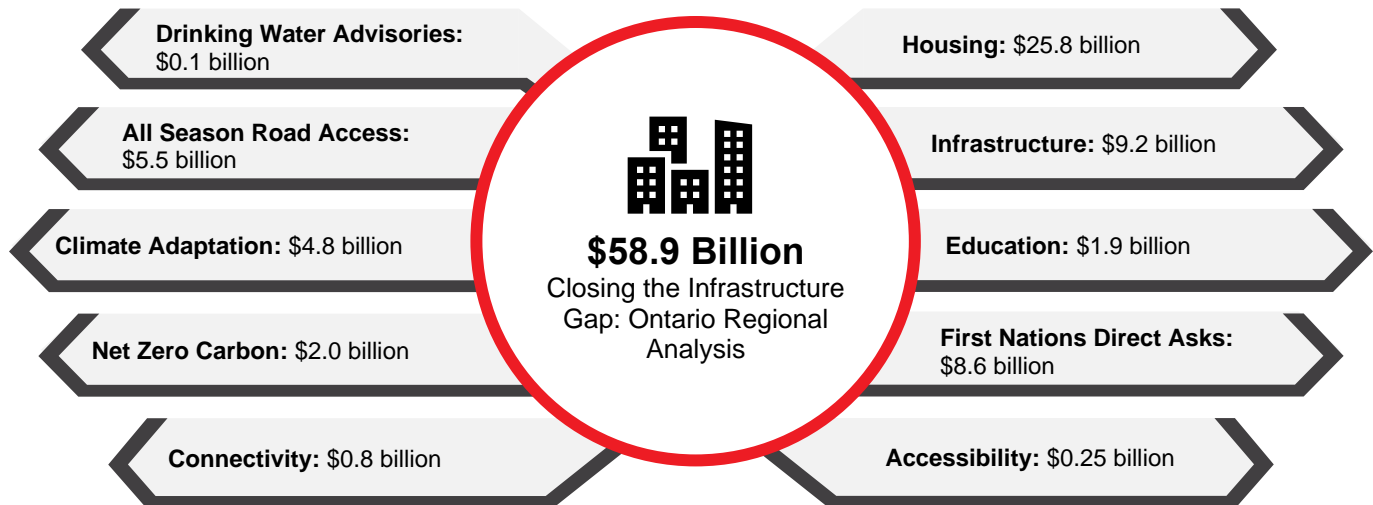
For a full list of definitions, refer to Appendix 1.



4.0 Summary of Funding Requirements – Ontario

An overall summary of the Ontario funding requirement is presented below in Table 1.

Figure 1: Closing the Ontario Infrastructure Gap Cost Summary





The following table provides a summary of the funding requirements for the fiscal years 2023-2024 to 2029-2030 to help satisfy the requirements of the Ontario - Closing the Infrastructure Gap program and includes the need from 2023-2030.

Table 1: Yearly Cost Data by Infrastructure Type to Close the Infrastructure Gap in Ontario

Closing the Ontario Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Housing								
Total Capital Cost	1,548	2,438	3,381	3,482	3,587	3,694	3,805	21,935
Total O&M	272	428	594	612	630	649	669	3,854
Housing Subtotal	1,820	2,867	3,975	4,094	4,217	4,343	4,474	25,789
Education								
Total Capital Cost	87	137	191	196	202	208	214	1,235
Total O&M	50	78	110	113	117	120	125	713
Education Subtotal	137	215	301	309	319	328	339	1,948
Infrastructure								
Total Capital Cost	414	652	904	931	959	988	1,018	5,866
Total O&M	235	370	513	529	544	561	578	3,330
Infrastructure Subtotal	649	1,022	1,417	1,460	1,503	1,549	1,596	9,196
SUB-TOTAL	2,606	4,104	5,693	5,863	6,039	6,220	6,409	36,934
Connectivity								
Total Capital Cost	60	94	131	135	139	143	147	849
Connectivity Subtotal	60	94	131	135	139	143	147	849
All-Season Road Access								
Total Capital Cost	318	500	694	715	736	758	781	4,502
Total O&M	70	109	152	156	161	166	171	985
All-Season Roads Total	388	609	846	871	897	924	952	5,487
Climate Adaptation								
Total Capital Cost	267	420	583	600	618	637	656	3,779
Total O&M	71	111	154	159	164	169	174	1,002
Climate Adaptation Subtotal	338	531	737	759	782	806	830	4,781



Closing the Ontario Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Net Zero								
Total Capital Cost	139	218	303	312	321	331	341	1,965
Net Zero Subtotal	139	218	303	312	321	331	341	1,965
Drinking Water Advisory								
Total Capital Cost	3	5	7	7	7	7	7	42
Total O&M	4	7	10	10	10	10	11	62
Drinking Water Advisory Subtotal	7	12	16	17	17	18	18	104
Accessibility								
Total Capital Cost	17	27	38	39	40	41	43	246
Accessibility Subtotal	17	27	38	39	40	41	43	246
First Nations Direct Asks								
Total Capital Cost	604	951	1,319	1,358	1,399	1,441	1,484	8,557
First Nations Direct Ask Subtotal	604	951	1,319	1,358	1,399	1,441	1,484	8,557
TOTAL FUNDING	4,159	6,546	9,082	9,353	9,635	9,924	10,223	58,922

The Housing, Education and Infrastructure amounts have been derived from previous studies undertaken by Assembly of First Nations (AFN) consultants. BTY Group has reviewed these studies and, in some instances, modified the funding requirements in the studies' conclusions.

The budgets for the remaining asset categories, focussing on such issues as climate adaptation, eliminating drinking water advisories, Connectivity, Net-Zero Carbon, Year-round access, and providing accessibility, have been developed as part of the current budgeting exercise.

Where possible, the unit rates employed for capital and O&M costs have been assessed/verified using BTY's Internal Cost Database, with consideration to geographical location and remoteness of the asset.

In all cases, the budgets for each fiscal year have been escalated to the year in which they are planned to be required. For further details of the approach, refer to CTIG 2030 Report.



5.0 Ontario Capital and O&M Budget by Asset Class

5.1 Infrastructure

5.1.1 Approach and Assumptions

The primary source of information for this study was data compiled by ISC and the First Nations Asset Needs study undertaken by Associated Engineering (AE) and published in March 2022.

AE's defined paradigms, including sizes, for each type of facility and made use of construction unit rates to develop Capital Replacement Values (CRVs) for each type of facility to arrive at budgeted amounts. These budgets were then adjusted by zone to reflect local market conditions. O&M costs were estimated based on standard periodic replacement intervals and percentages of CRVs. This report was a major undertaking that culminated in the identification of a 20-year investment need of \$73 billion in 2021 dollars. Readers are encouraged to acquaint themselves with the details of AE's report to gain a greater understanding of its scope and methodology.

BTY Group reviewed AE's base unit rates for the broad scope of work under consideration and derived a CRV (capital replacement value) total for all the assets using AE's quantities. The total value of the portfolio was within 10% of AE's value, well within an acceptable range given the high-level analysis undertaken. BTY did not replicate AE's modelling of the funding needs beyond this unit rate review. The funding needs developed by AE were marked up to allow for escalation since the date of pricing in 2021, escalation to the year in which costs will be incurred, contingencies and soft costs to provide a more comprehensive view of the funding requirement.

AE's review was for a 20-year timeframe, so the resulting costs were then adapted to the 2030 timeline of this report, including preparing an annual cash flow. This includes the need from 2019-2030, with expenditure being forecast between 2023 and 2030.

5.1.2 Infrastructure Capital Budget

Based on the above approach, our findings are as follows:

Table 2: Infrastructure – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Infrastructure								
Infrastructure Capital Cost	414	652	904	931	959	988	1,018	5,866
TOTAL CAPITAL COST	414	652	904	931	959	988	1,018	5,866



5.1.3 Infrastructure O&M Budget

Table 3: Infrastructure – Operation and Maintenance Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Infrastructure								
Infrastructure O&M Cost	235	370	513	529	544	561	578	3,330
TOTAL O&M COST	235	370	513	529	544	561	578	3,330

5.2 Housing

5.2.1 Approach and Assumptions

The review of the Housing report prepared by the Institute of Fiscal Studies and Democracy (IFSD) in 2021 aimed to provide the Assembly of First Nations (AFN) with up-to-date housing costs for On-Reserve Housing and Related Infrastructure.

A report prepared by the First Nations Information Governance Centre and titled “First Nations On-Reserve Housing and Related Infrastructure Needs” was issued in July 2020 and formed an important basis for the IFSD Report “Cost analysis of current housing gaps and future housing needs in First Nations”, the final report of which was issued on October 18, 2021.

The results of the FNIGC report were based on a questionnaire distributed to First Nations requesting information on the existing housing stock, housing subsidy and ownership, housing major and minor repair needs, system capacity and current and future needs. The questionnaire also asked about the types of housing data that First Nation communities record with respect to housing and infrastructure.

The survey sample representing all seven regions, Yukon, British Columbia, Saskatchewan, Ontario, Quebec, New Brunswick, Atlantic (including Nova Scotia; Prince Edward Island; and Newfoundland and Labrador) were included in the results.

85,738 housing units were reported by respondents across the participating regions, mostly single-family homes (91%). The total apartment housing units reported was 1,386. Emphasis was also given to the availability and need for serviced lots. A serviced lot refers to a parcel of land that has the required utilities for a housing unit (water, wastewater, sewer, power), but not to the off-parcel requirements to bring the services to the lot boundary.

IFSD’s report “Cost analysis of current housing gaps and future housing needs in First Nations” was issued on July 30, 2021, under a mandate from AFN. IFSD took a three-part approach:

- 1) Ten First Nations collaborated with IFSD to build in-depth case studies and analysis on housing needs, costs, opportunities, and challenges.



- 2) Cost estimation of current and future needs using data from FNIGC's survey for AFN with consideration of growth factors such as population, migration, and inflation.
- 3) Performance measurement for well-being: A future-focused framework was developed by leveraging best practices from other jurisdictions, a holistic wellbeing understanding of housing, with consideration of First Nations care and control of delivery.

The above approach identified the following housing needs in Ontario only.

Table 3: Ontario Housing Needs

Ontario Housing Need	Overcrowd	Migration	Replace outdated units	New Units (2019-2021)	New Units (2022-2040)	New Units (2022-2030)	Total New Units (2019-2030)	Service New Lots	Minor Renos	Major Renos
Units	5,786	13,158	3,950	707	7,619	3,386	26,987	22,830	7,809	8,272

BTY has reviewed the unit costing for all housing needs in Ontario, and adjusted it based on current rates as of August 2022, considering current market conditions. Assumptions made during BTY's evaluation of the Housing report are as follows:

New Units

- Assumes there was or is an existing structure that was or will be removed, and therefore the lot has already been serviced and a new unit is needed on that lot
- Assumes that all residential units are 1,500 sf single-family homes
- Assumes site serviced lots already exist to accommodate new units
- Assumed 20% for soft costs

Service New Lots

- Assumes major infrastructure cost is part of the asset replacement need, and local tie-in to services is only required. Streetlighting, roads and mains is included in the infrastructure asset budget.
- Assume 5,000 sf lots.
- Assume 10% of all lots serviced will require rock blasting.
- Driveway assumed to be included in house construction cost.
- Assume 10% of Service Lots in Zones 3 and 4 will have decentralised water and wastewater systems.
- Assume all service connections are within 50m of house.
- Assume all services are within 5m of the property line
- Assume 20% for soft costs



Minor Renovations

- Replacement of windows and doors, roof covering and the exterior cladding and various interior works.
- Assume 10% of overall construction cost.

Major Renovations

- Replacement of many components of a dwelling (for example, windows and doors, roof, floor covering, exterior cladding, plumbing, electricity, heating, insulation, etc.).
- Assume 1,500 sf single-family homes.
- Assume major renovations to be 30% of overall construction cost.
- Existing FN Housing Operation and Maintenance
- Based on 1.95% of construction cost per annum.
- This calculation is based on a % of the construction cost. Due to the unknown quantities in each Zone/region, we have used the average unit cost across Canada.
- O&M excludes electricity, water, property tax, insurance, internet, and TV.

New Housing Operation and Maintenance

- This calculation is based on a percentage of the construction cost and considers the cost of construction for all regions and zones.
- Based on 1.95% of construction cost per annum.
- Applies to all new housing units.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.2.2 Housing Capital Budget

The following table summarises the cash flow requirements for the Housing capital program to 2030.

Table 4: Housing – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Housing								
Capital Cost	1,548	2,348	3,381	3,482	3,587	3,694	3,805	21,935
TOTAL CAPITAL COST	1,548	2,348	3,381	3,482	3,587	3,694	3,805	21,935



5.2.3 Housing Operations and Maintenance

The following table summarizes the Housing O&M funding cash flow requirements.

Table 5: Housing – Operations and Maintenance Cost Analysis

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Housing								
O&M Cost (Existing Housing)	272	428	594	612	630	649	669	3,854
TOTAL O&M COST	272	428	594	612	630	649	669	3,854

The quantity of existing housing units was provided in the IFSD Housing report.

5.3 Education

5.3.1 Approach and Assumptions

BTY were provided with the AFN First Nations Education Infrastructure Capital Needs Assessment, issued by First Nations Engineering Services Ltd (FNESL) in August 2021 and the AFN First Nations Education Infrastructure Operation and Maintenance Needs Assessment also issued by FNESL in January 2022.

First Nations Engineering Services Ltd. was retained to complete a National First Nations Education Infrastructure Capital Needs Assessment over a 20-year planning period. Its capital needs assessment report was issued in August 2021 and was followed by an assessment of O&M requirements in January 2022. The studies focused on two main asset types: schools, including provision for outdoor learning, and teacherages, to provide on-reserve accommodation for teaching staff.

An assumption in the study is that schools will offer the same grades as are currently offered and considered Additions and New Construction for Schools and Teacherages.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.



5.3.2 Education – Capital Cost Data

The following table summarizes the capital funding requirement for education assets to 2030:

Table 6: Education – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Education								
Capital Cost Schools	68	108	150	154	159	163	168	970
Capital Cost Teacherage	19	29	41	42	43	45	46	265
TOTAL CAPITAL COST	87	137	191	196	202	208	214	1,235

5.3.3 Education – Operations and Maintenance Cost Data

The following table summarises the annual Education O&M funding requirement.

Table 7: Education – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Education								
O&M Schools	43	66	92	95	98	101	104	559
O&M Teacherages	7	12	18	18	19	19	20	113
TOTAL O&M COST	50	78	110	113	117	120	125	713



5.4 Drinking Water Advisory

5.4.1 Approach and Assumptions

BTY were provided with the Associated Engineering memo, which identifies the infrastructure investment required to address ongoing water quality issues on First Nations reserves and specifically to end long-term drinking water advisories (DWAs).

Ending long-term drinking water advisories is a complex process and requires collaboration between First Nations communities, Province of Ontario, and the Government of Canada, and a range of other key interested parties for each specific site, which may include local governments, landowners, municipalities, and industry. It is not all about water treatment. The supply chain for clean drinking water involves source waters (surface water, groundwater), abstraction (groundwater wells and surface water intakes), treatment, storage (tanks, reservoirs, and cisterns), transmission, and distribution (both piped systems and trucked water). The development of sustainable, practical best-practice solutions typically encompasses:

- Comprehensive feasibility studies – to identify a range of site-specific solutions and allow the optimum solution to be selected for the situation.
- Project development – taking account of labour, material, and equipment availability for both construction and ongoing operations and maintenance of any developed or upgraded infrastructure.
- Training and support of operations and maintenance staff.
- Ongoing operations and maintenance of the facilities – including monitoring and testing.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.4.2 Drinking Water Advisory – Capital and O&M Cost Data

The following table summarises the Capital and O&M funding requirements to address the current Long Term Drinking Water Advisories in Ontario by 2023.

Table 8: Drinking water Advisory – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Drinking Water Advisory								
Capital Cost Drinking Water Advisory	3	5	7	7	7	7	7	42
O&M Drinking Water Advisory	4	7	10	10	10	10	11	62
TOTAL CAPITAL COST	7	12	16	17	17	18	18	104



5.5 All Season Access Roads

5.5.1 Approach and Assumptions

BTY were provided with the Associated Engineering memo, which identifies the cost of replacing winter roads with all-season roads across Canada.

The estimate is based on the definition of winter road network developed by the FPT sub-working group on Northern Transportation in 2015. Establishment of this definition excluded approximately 2,000 km of winter road from the existing network and, consequently, some uncertainty does exist regarding the actual extent of Canada's winter road network. For simplicity, this discussion paper uses an estimate of 8,000 km to describe the road network serving First Nations communities to conform with current research on the subject area. The winter road network in Ontario is defined as 3,160km long, serving 31 First Nations.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.5.2 All Season Access Road – Capital and Operation and Maintenance Cost Data

The following table summarises the Capital funding requirement for replacing Ontario's winter road network with an all-season alternative built to a gravel road standard.

Table 9: All Season Access Road – Capital And O&M Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
All Season Roads								
Capital Cost All Season Access Road	318	500	694	715	736	758	781	4,502
O&M All Season Access Road	70	109	152	156	161	166	171	985
TOTAL CAPITAL AND O&M COST	388	609	846	871	897	924	952	5,487

5.6 Climate Adaptation

5.6.1 Approach and Assumptions

BTY were provided with the Associated Engineering memo which identifies the additional financial investment necessary to manage the risk of climate change to First Nations infrastructure by 2030. Risk is defined here as the combined impact of:

- The likelihood of the event based on available climate projection data and specific to the region in which the asset is situated.
- The exposure of the asset to climate hazards, which is specific to its location.



- The consequence of the climate event, expressed in terms of the asset type, its size, and its value. Consequence was appraised in terms of potential damage to the asset resulting from chronic issues, such as declining road surface conditions resulting from more frequent extreme heat events or more acute events such as severe storms.

The funding requirements were divided in to five categories: Buildings, Housing, Transportation, Utility and Emergency Preparedness. In addition, the preservation and enhancement of natural assets such as firebreaks will be necessary to mitigate the threat created by climate change. Refer to the CTIG Report for further detail.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.6.2 Climate Change – Capital and Operational and Maintenance Cost Data

The following table summarises the Capital and O&M funding requirement to manage the proposed adaptations to manage the risk of climate change to First Nations assets based on assessed risks.

Table 10: Climate Change – Capital and O&M Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Climate Adaptation								
Capital Cost Climate Adaptation	267	420	583	600	618	637	656	3,779
O&M Climate Adaptation	71	111	154	159	164	169	174	1,002
TOTAL CAPITAL AND O&M COST	338	531	737	759	782	806	630	4,781

5.7 Net Zero Carbon

5.7.1 Approach and Assumptions

BTY were provided with the Associated Engineering memo identifies the additional financial investment necessary to put First Nations on the path to Net-Zero Carbon by 2050.

An important part of achieving Canada’s net-zero future starts by Closing the Infrastructure Gap by 2030 for First Nations. The need to reduce the carbon emitted by existing federally funded infrastructure and prepare new facilities on First Nation lands for net-zero capacity is an immediate starting point to deliver on the Canadian Net-Zero Emissions Accountability Act and carbon emissions reduction target.

The scope and costs evaluated in this report constitute Tier 2 in the energy hierarchy. The first two tiers of the energy hierarchy are also intended to manage Scope 1 emissions, defined by the international Greenhouse Gas Protocol as those directly resulting from an organization’s facilities and vehicles, which are the primary form of emissions by First Nations.

Therefore, the focus is on the following:



- Improving the Energy Efficiency of First Nations Residential and Non-Residential Buildings
- Improving the energy efficiency of First Nations Vehicles and Fleet Infrastructure
- Improving the energy efficiency of First Nation Utilities Systems, Building Utility Scale Renewable Systems

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

Refer to the CTIG Report for further details.

5.7.2 Net Zero Carbon – Capital Cost Data

The following table summarises the Capital funding requirement to improve the energy efficiency of First Nations Housing, Vehicles and Fleet Infrastructure and Light-Duty Vehicles, by 2030.

Table 11: Net Zero – Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Net Zero Carbon								
Capital Cost Net Zero Carbon	139	218	303	312	321	331	341	1,965
TOTAL CAPITAL COST	139	218	303	312	321	331	341	1,965

5.8 Connectivity

5.8.1 Approach and Assumptions

BTY were provided with the memo prepared by Planetworks Consulting, its sub-consultant, which identifies the extent of the wired and mobility wireless infrastructure gaps in First Nation communities and provides capital budgets to resolve the gaps and ensure every First Nation community has:

- A fibre backbone to the Internet
- Fibre-to-the-home (FTTH) last mile, and
- LTE or 5G mobility services

5.8.2 Connectivity – Capital Cost Data

The following table summarises the Capital funding requirement necessary for every First Nations community to have a fibre backbone, FTTH wired last mile and LTE or 5G mobility services.



Table 12: Connectivity - Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Connectivity								
Capital Cost Connectivity	60	94	131	135	139	143	147	849
TOTAL CAPITAL COST	60	94	131	135	139	143	147	849

5.9 Accessibility

5.9.1 Approach and Assumptions

BTY were provided with the Associated Engineering memo, which identifies the cost of retrofitting First Nation building assets across all categories to meet the requirements of the Accessible Canada Act (ACA), exclusively to buildings. It does not include other important accessibility measures related to communications, technology, and of a more universal organizational or attitudinal nature. Three major categories of measures emerged for residential and non-residential construction and were applied against all assets listed in the registry either as:

- Category 1: a bundle of minor measures such as grab bars in bathrooms or washrooms.
- Category 2: a bundle of more extensive measures such as widening corridors and entries, replacing change rooms in recreation centres with fully accessible design, or changing vanity and kitchen counter heights to accommodate wheelchair users.
- Category 3: a bundle of measures including elevators or stair lifts, ceiling rails to enable transport of a bed-bound person to a bath, exterior ramps, and secondary fire exits. Note that secondary fire exits are now mandatory under Canadian fire codes.

For a list of measures necessary to improve the accessibility of First Nation residential and commercial assets in Ontario, refer to the CTIG Report for further details.

O&M costs are included in the Infrastructure O&M budget, as all accessibility improvements are specific to the assets included in Infrastructure study.

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.9.2 Accessibility – Capital Cost Data

The following table summarises the Capital Cost funding requirement to retrofit First Nations building assets for accessibility.



Table 13: Accessibility - Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
Accessibility								
Capital Cost Accessibility	17	27	38	39	40	41	43	246
TOTAL CAPITAL COST	17	27	38	39	40	41	43	246

5.10 First Nations Direct Ask – Including a summary of trends from survey in Ontario

5.10.1 Approach and Assumptions

Indigenous Services Canada has worked with the Assembly of First Nations, in part, to quantify the infrastructure needs of First Nations communities.

An ISC-led engagement took place with individual First Nations throughout the spring and summer of 2022. ISC provided First Nations across Canada with a letter requesting communities submit a list of their infrastructure asset needs, ordered in terms of paramount of need. No restrictions were placed on the type, quantity, or cost of assets for communities to identify what is required to close their infrastructure gaps.

Responses were received throughout the summer and early fall; by October 24th, 2022. 96 of the 126 First Nation communities responded to this survey, equating to 76% of First Nations in Ontario.

Asset lists were examined by Indigenous Services Canada, and the costing of assets, if provided by communities, was evaluated against previously completed projects and industry information. Costing figures originated from communities, and unless costing was outside of normal ranges for similar projects, the values were included as-is.

The First Nation Direct-Asks that were received as a part of the cost report exercise were then compared against the AFN National First Nation Assets Needs Study to ensure no overlap of infrastructure costs occurred and that a comprehensive and complete number was compiled into the final cost report. Any excluded information in this exercise has been further qualified in the cost reports subsections and appendices.

The following Infrastructure Asset Categories have been included in the First Nations Direct Ask, as defined by ISC.

- **(CA) Community Accessibility Assets** - Includes All-weather roads to connect communities, includes hydro and related assets to connect to communities (does not include in-community hydro), external bridges. All assets are external to the community.
- **(TR) Transportation Infrastructure** – Includes Roads, Bridges, Waterways, Airports and Tunnels within the community.



- **(WW) Water, Wastewater and Utilities** - Includes water treatment plants, lift stations, water and wastewater pipes, lagoons, in-city hydro, and connections.
- **(SW) Solid Waste and Recycling** - Includes waste processing areas, landfills, garbage trucks.
- **(ET) Education and Training** - Includes schools, vocational training, Indigenous language training.
- **(ES) Emergency Services** - Includes fire, ambulance, police.
- **(HS) Health** - Includes all Health-related Assets, nursing stations, clinics, long term care homes.
- **(SP) Social Programs** - Includes Social Work, Child Care, Men's, and Women's Shelters. Includes Elders Complexes not identified as Long-Term Care homes.
- **(CU) Cultural Assets** - Includes cultural centres, ceremonial grounds, powwow grounds, museums.
- **(CO) Community Assets** - Includes community centres, community costs and studies, libraries, community workshops and storage areas, ATR additions to reserve, administrative buildings. Includes all vehicles for the community.
- **(RA) Recreation Assets** - Includes trails, arenas, baseball diamonds.
- **(ED) Economic Development** - Includes gas stations, hotels

This cost distribution was completed and BTY applied cumulative escalation rates to the capital and O&M costs based on their anticipated year of expenditure.

5.10.2 First Nations Direct Ask – Capital Cost Data

The following table summarizes the Capital Cost funding requirement defined by the output of the ISC Survey:

Table 14: First Nation Direct Ask - Capital Cost Data

Closing the Infrastructure Gap 2030 (\$ millions)	2023 to 2024	2024 to 2025	2025 to 2026	2026 to 2027	2027 to 2028	2028 to 2029	2029 to 2030	Total (\$ million)
First Nation Direct Ask								
Capital Cost First Nation Direct Ask	604	951	1,319	1,358	1,399	1,441	1,484	8,557
TOTAL CAPITAL COST	604	951	1,319	1,358	1,399	1,441	1,484	8,557



5.11 Cost of doing nothing - Impact to 2040

First Nations across the country have endured severely underfunded and ineffectively connected programs aimed at improving self-determination and socioeconomic outcomes. This status-quo approach is a primary contributor to the significant infrastructure gap that exists today. Given present economic conditions as well as available historical data, the gap will only continue to grow if major systematic remediations remain unaddressed.



Despite various government declarations, commitments, acts, and the Truth and Reconciliation Commission of Canada's calls to action, First Nations continue to endure challenges and hardships such as drinking water advisories, overcrowded homes, lack of safe all-season road access to remote communities, inadequate digital connectivity, and severely deficient education and community facilities.



6.0 Short Term Pressures and Construction Industry Trends

Ontario's economic climate for 2024 and beyond will be shaped by various factors including inflation, interest rates, government expenditure, housing and infrastructure demand, and shifts in consumer spending. These factors, as well as labour availability, industry capacity, and investment commitments will have a significant impact on the construction industry now and into the foreseeable future.

6.1 Inflation

In Ontario, 2023 saw continued challenges regarding inflation levels, nominal GDP growth, increasing immigration, and rising demand for housing, transportation, healthcare, and other public services. From an economic perspective, the province's real GDP is anticipated to have grown by 1.1% in 2023, with a more modest 0.5% growth forecast for 2024, followed by an anticipated rise to 2.0% in 2025 and 2.8% in 2026. The provincial government also anticipates deficits of \$5.6 billion in 2023–24 and \$5.3 billion in 2024–25, before a forecasted surplus of \$0.5 billion in 2025–26¹.

Although short-term GDP growth is projected to be nominal, Ontario does represent a significant portion of Canada's overall GDP and is supported by a diverse economy and a significant population size. However, inflation during the pandemic and record immigration levels have driven prices for goods and services upwards. This is significant for the construction industry, as cost escalation is a significant risk to manage on any project, especially on developments with multi-year construction periods.



BTY's Cost Management team, which helps clients evaluate and control construction costs on projects, is currently forecasting construction cost escalation in the range of 5% to 7% in 2024 for Ontario.

In recent times, several key factors have contributed to escalation and rising costs in the construction industry, including:



Public Demand

On June 16, 2023, the population of Canada grew to 40 million people.

When compared to Q3 2022, Ontario's population grew to 15.6 million (+3.06%), a significant portion of this being due to immigration.² This creates demand for essential infrastructure such as housing, transportation, education, and healthcare. Rising demand for goods and services have been a key contributor to the rising costs across the construction industry. With growing costs and increased interest rates, many construction projects were found to be unfeasible and have been put on hold or cancelled as margins slim and investment wanes in the industry.

¹ <https://budget.ontario.ca/2023/fallstatement/brief.html#:~:text=and%20its%20finances.-,Ontario's%20Economic%20Outlook,lower%20for%202024%20and%202025.>

² Statistics Canada. Table 17-10-0009-01 Population estimates, quarterly



Bank of Canada Overnight Rate

The Bank of Canada has an ongoing objective to maintain the annual inflation rate at roughly 2%. A key instrument for this purpose is the Policy Interest Rate, or Overnight Rate, which is the short-term interest rate provided by the Bank of Canada and informs financial institutions of the target interest rate for overnight loans. The Bank of Canada reviews and amends the Overnight Rate eight times per calendar year as part of their monetary policy.

To manage inflation, the Bank of Canada has increased the Overnight Rate (which in turn increases the Bank Rate and the Deposit Rate) as part of their Quantitative Tightening strategy, which aims to reduce the money supply in the economy. The net result of increasing the Overnight Rate is that the cost of lending increases. Over the course of the increases that have been implemented (1.5% in June 2022 to 5% at present) we can observe broad reductions in demand for borrowing and a slowdown of new capital into local markets, cooling economic growth.

The rising cost of capital has left many projects in a challenging position to remain financially feasible, the costs of which are ultimately passed onto the end user.



Energy Prices

Energy costs and the transportation of goods and materials play a contributing role to escalation in the construction industry. Rising costs associated with diesel, transportation via cargo ships, and power required on construction sites are just a few examples where the pricing volatility of energy has a direct impact on construction project costs.



Supply Chain Logistics

The COVID-19 epidemic's impact on global supply chains has had a lasting impact on logistics worldwide. Supply chain logistics in North America have faced significant challenges in recent years, contributing to rising costs in the construction industry. Supply chain issues waned in the latter half of 2023, but may be ramping up again due to geopolitical tensions.



Labour Wages

Wage growth in Canada has been relatively stagnant since 1998 when adjusted to inflation.³ However, during COVID-19, significant growth in wages was observed, in part to the rising demand for labour. A significant portion of this growth was found in the construction industry, due to its being deemed essential during the pandemic. This however has led to a wide array of challenges in maintaining a skilled worker population.

For example, the construction industry has observed numerous union disputes, strikes, port shutdowns, and worker unrest due to the rising cost of living and demand for flexible working arrangements. Educated youth often shy away from careers in skilled trades in favour of white-collar professions, and freedom of movement for workers leads to volatility in the local availability of skilled workers.

The economic outlook for Ontario in 2024 is characterized by cautiousness amidst a backdrop of global uncertainties, inflationary pressures, and rapid demand for housing and other essential infrastructure. The government's fiscal constraints and the necessity to balance inflation with economic growth create a complex scenario.

For the construction industry, rising material and labour prices as well as the increased cost of financing has led to overall growth in project development costs. With the rising demand for construction, it is not unreasonable to assume that construction escalation will continue to grow for the foreseeable future. This means projects with longer timeframes will continue to become more expensive to complete and any delays will be a costly burden for asset owners.

6.2 Construction Trends in Ontario

Ontario features one of Canada's most robust economies, with a large population and access to global trade. The province's construction sector has been a significant contributor to its economy, underpinned by strong labor force statistics and consistent investment in infrastructure.

Figure 2 highlights recent statistics⁴ showcasing a similar trend in growth for both construction labour force figures as well as investment in infrastructure across the province:

³ <https://www150.statcan.gc.ca/n1/pub/14-28-0001/2020001/article/00006-eng.htm#shr-pg0>

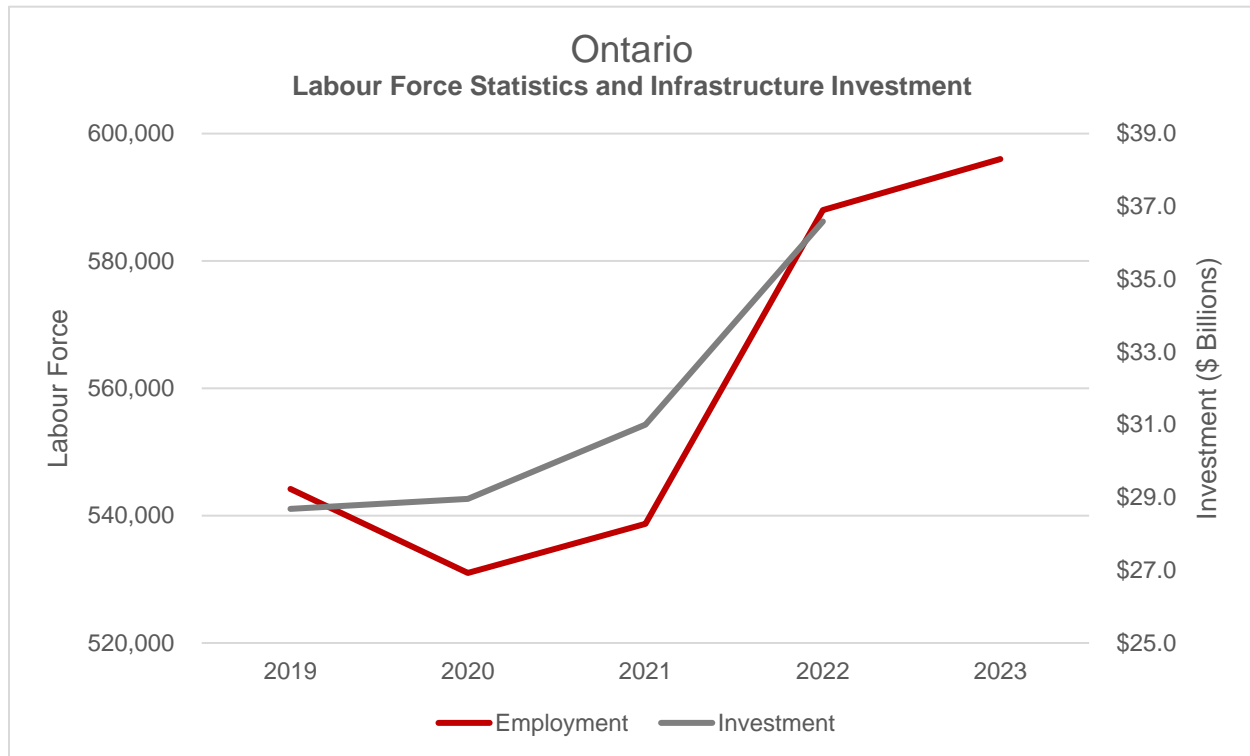
⁴ Data accessed includes:

<https://www150.statcan.gc.ca/t1/tbl1/en/cv/recreate.action?pid=1410002301&selectedNodelds=1D7,2D2,3D9,5D1&checkedLevels=3D1&refPeriods=20190101,20230101&dimensionLayouts=layout2,layout3,layout2,layout2,layout2&vectorDisplay=false>

and
<https://www150.statcan.gc.ca/t1/tbl1/en/cv/recreate.action?pid=3610060801&selectedNodelds=1D7,2D1,3D1&checkedLevels=3D1,4D1,5D2&refPeriods=20180101,20220101&dimensionLayouts=layout2,layout2,layout2,layout2,layout3,layout3,layout2&vectorDisplay=false>



Figure 2: Ontario Labour Force Statistics



Since a minor slump due to COVID-19 during 2019/2020, both investment and labour force participation have shown strong growth in recent years. Presently, growth has slowed, likely due to high inflation, the increased cost of borrowing, and the fear of a recession.

An important consideration is that to support any significant investment in infrastructure and subsequent demand for construction, labour force participation likely needs to grow in tandem. A related metric that can be considered is Statistics Canada's Capacity Utilization Rate (CUR). It provides insights into the construction industry's productivity output.

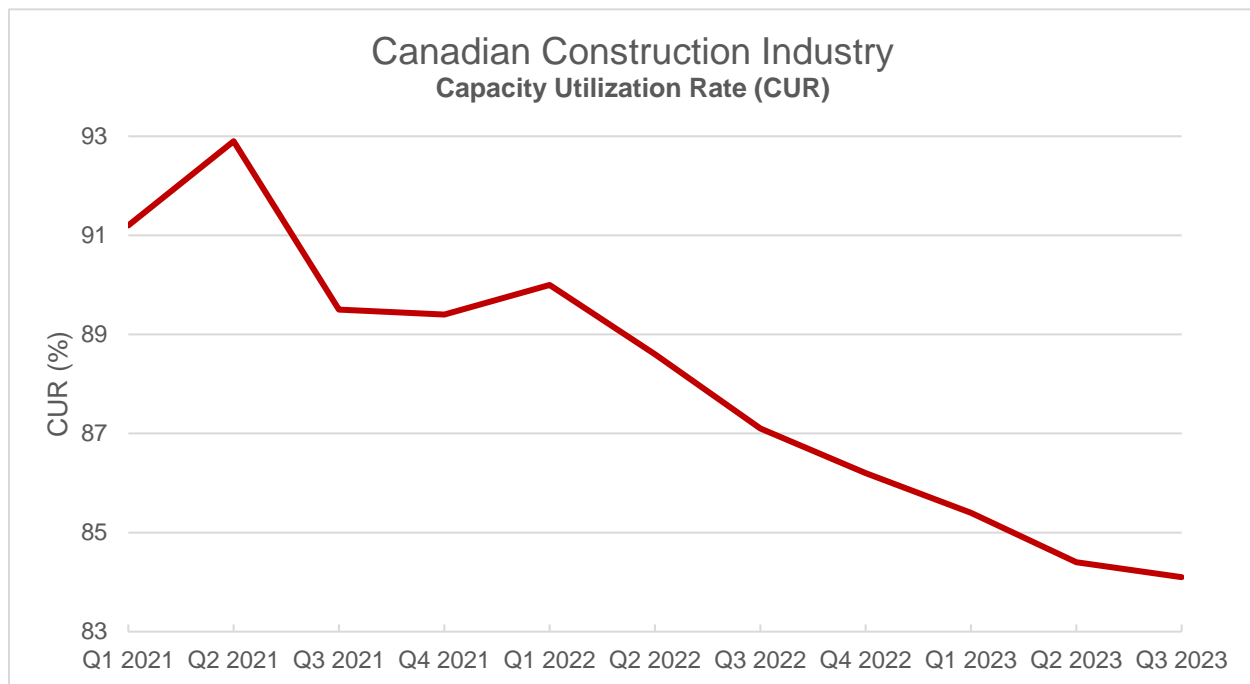
Capacity utilization is defined as the percentage of actual output relative to potential output. The primary purpose of the CUR is to highlight how efficiently industries are operating in relation to their maximum potential. Several factors may influence the CUR, such as the employment rate, demand, seasonality, government stimuli, and the state of the economy.

Figure 3 highlights the construction industry's CUR⁵ since Q1 2021:

⁵ Statistics Canada. Table 16-10-0109-01 Industrial capacity utilization rates, by industry



Figure 3: Construction Industry Capacity Utilization Rate (Canada)



Recently, the CUR has been steadily declining, likely in part due to the Quantitative Tightening measures implemented by the Bank of Canada. Rising costs, reduction in available capital, and rapid immigration have also played a significant role as fewer projects maintain feasibility through current challenging economic conditions.

With these statistics in mind, one could surmise that Ontario's construction industry has the capacity to bear a portion of the additional infrastructure investment needed as outlined by the Closing the Infrastructure Gap mandate. However, significant growth in the population of skilled trades, innovative financing methods, streamlined procurement and compliance methods, robust supply chains, and many other factors will contribute to the industry's ability to meet CTIG's increased construction needs.

6.3 Future Investment

As outlined in the Province of Ontario's 2023/2024 Fall Economic Statement⁶ (FES), the government has outlined **\$185 billion** of spending over the next 10 years, including \$20.7 billion in 2023/24. A quick summary of the planned capital infrastructure expenditure includes:

- Highways: **\$28.1 billion** over 10 years for new and expanded highways, including Highway 413, Bradford Bypass, QEW Garden City Skyway Bridge Twinning project, and more.

⁶ <https://budget.ontario.ca/2023/fallstatement/index.html>



- Transit: **\$70.7 billion** over 10 years for public transit expansion, including transforming the GO Transit rail network and expanding services to various regions.
- Health: Over **\$48 billion** in the next 10 years for health infrastructure, supporting over 50 hospital projects, adding 3,000 new beds, and funding various hospital developments.
- Long-Term Care: Advanced construction on 11,199 beds and investment totaling **\$6.4 billion** since 2019 to build and upgrade long-term care beds.
- Broadband: Nearly **\$4 billion** from 2019–20 to ensure province-wide high-speed internet access by 2025.
- Education: **\$22 billion** over the next 10 years, including about \$15 billion in capital grants for new schools, childcare spaces, and school renewals.
- Postsecondary Education: **\$5.4 billion** over the next 10 years, including over \$2 billion in capital grants, for modernizing postsecondary education facilities.

By comparison, the funding ask outlined by CTIG for Ontario represents **45.5%** of the total investment committed above by the government from now to 2030.⁷ CTIG also allocates investment into specific needs established by First Nations, often significantly different to the amounts outlined by the province. For example, CTIG highlights a need of \$850 million worth of digital connectivity infrastructure for Ontario, compared to the broadband infrastructure commitment of \$4 billion (i.e., CTIG's needs are only 21.3% of the overall broadband investment). CTIG also outlines a need of \$1.948 billion for education infrastructure, less than 10% of the investment announced by the province.

Beyond the need for investment, significant improvements and innovations will be needed to deliver the significant infrastructure need for both Ontario and Canada. These include, but are not limited to:

- Streamlined procurement mechanisms and delivery methods to maximize efficiency, either by bundling related infrastructure projects together and/or with robust contract structures that balance risk between public and private sector participants equitably;
- Alternative financing methods that enable the private sector to contribute some of the capital for the projects needed; and
- Engagement of the public to drive engagement and encourage labour force participation and worker productivity.

The required investment in infrastructure for Ontario is significant, with a diverse range of asset classes that need modernization to meet present and future demand. A consistent and collaborative approach between the public and private sectors, education and training programs, innovative financing techniques, stable government planning and funding programs, and engagement of the construction industry will all be critical to drive the monumental amount of infrastructure needed to close the gap.

⁷ CTIG Ontario investment need of \$58.9 billion compared to Province of Ontario spending commitment of \$129.5 billion (\$18.5 billion average spend per year, seven years)



7.0 Next Steps

The budgets provided in this report concentrate on a wide range of asset classes. The Chiefs of Ontario are fully aware that further work is required to ensure that the needs of First Nations are fully addressed during the remainder of the decade. The response to this will be an ongoing commitment to enhancing the process of gathering data from First Nations in Ontario and refining the processes for determining the needs of First Nations relative to the rest of the Canadian population.

8.0 Ownership and Copyright

8.1 Report Reliance

All information, reports, publications, documentation, copyright, trademarks, materials, drawings, books, manuals, or other deliverables resulting from the provision of Services, and all right, title, and interest to the same shall, as between the company and the Consultant, be and remain the property of the Assembly of First Nations. Notwithstanding the above, ownership and copyright over materials and documentation created by the Consultant prior to this Agreement, shall be and remain the property of the BTY Consultancy Group Inc., however BTY Consultancy Group Inc. grants a perpetual license for the use of such materials and documentation to AFN.

Any concepts, know-how or techniques which are developed by the Consultant in the course of providing services, and all right, title and interest to the same shall, as between the company and the Consultant, be and remain the property of the Assembly of First Nations; provided however, that the Consultant may use any such ideas, concepts, know-how or techniques for the Consultant's own use.

8.2 Reporting Qualifications

This Report has been prepared based on information provided to us by the Client up to the issue date of this Report. BTY Group does not accept any liability or accountability for information that has not been provided or made available to us at the time of preparing this report. Any advice, opinions, or recommendations within this report should be read and relied upon only in the report's context.

CLOSING THE INFRASTRUCTURE GAP

Ontario Regional Analysis

APPENDICES

Appendix 1: Definitions

APPENDIX 1

Definitions



Definitions

Asset

An asset is an item or thing of value (ISO 55000). In this study, asset refers to physical assets such as buildings, ports and wharves, treatment equipment, pipes, civil structures, and vehicles.

Asset Age

An asset's age (in Years) is based on the number of years since the construction (or in-service date) for each asset to the current year (i.e., 2022).

Asset Category

Highest level of categorization of assets in the Integrated Capital Management System (ICMS). All assets fit into one of the five Categories (i.e., Buildings, Grounds, Transportation, Utility and Vehicles).

Asset Code

The three-digit code describes a unique asset type in the ICMS, incorporating the Category, Class, and Sub-Class (e.g., A5A).

Asset Class

The middle level of categorization of assets in the ICMS further refines the asset category (e.g., Roads, Recreational Buildings, Water Supply).

Asset Inventory

The data extracted from the ICMS containing all assets included in the study.

Asset Sub-Class

The bottom level of categorization of assets in the ICMS further refines the Class of the asset. (e.g., Gravel Roads, Libraries, Water Mains, Other).

Asset Type

Refers in general terms to different kinds of assets, not strictly following the ICMS classification system.

Capital Cost

Fixed one-time expenses incurred on the construction enhancement, purchase of land or equipment related to the project.

Capacity Utilization Rate

The ratio of an industry's actual output to potential output.

Current Replacement Value (CRV)

The total cost in 2022 \$CAD to replace the particular asset and make it functional, including purchase, construction, installation etc. This may be derived from either historical costs or current capital costs.



Contingencies

As defined in Section 3.2.3 of this report.

Expected Service Life (ESL)

The asset's expected life before it will no longer meet its functional need(s). This may vary significantly from a short-lived asset, such as computers/vehicles (e.g., five years), to a long-lived asset, such as a building foundation (e.g., 60 years).

Growth

The term growth generally means an increasing number of people, i.e., population increases. Growth as an investment driver is the investment required to accommodate the needs of a growing population. This study comprises making assets bigger (upsizing) and adding new assets to service the population.

Operations and Maintenance (O&M)

Investments in operations and maintenance ensure that an asset achieves its planned service life. These include immediate repairs and periodic replacement of components.

Remaining Service Life (RSL)

The number of years remaining from the asset's current age to the end of its ESL.

Regional Factors

As defined in Section 3.2.1 of this report.

Service Centre

Defined by ISC as a community where suppliers, materials, and equipment, as well as skilled and semi-skilled labour, are available and where at least one financial institution and minimum provincial and federal services are available.

Sustainment

Sustainment refers to the investment required to maintain current levels of service. It includes renewing assets at end of life and refurbishing/rehabilitation of assets.

School

A building designed to provide instruction inclusive of learning spaces and environments.

Teacherage

A building that provides both a school and or a residence for teachers.

Upgrades

Upgrade refers to the improvement of an asset through either upsizing or modification (e.g., retrofits) to meet changing regulatory requirements.



Zone

Degree of remoteness regarding proximity to a service centre. Each First Nation is assigned a Zone (i.e., score of 1-4, with four being the most remote), and all assets within that Nation are in the same Zone.

Zonal Factors

Adjustment factors to reflect the impact of remoteness on construction costs.

