

EXPECT DELAYS

Growing gaps in public service engineering are causing backlogs in delivering Ontario's priority infrastructure projects

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Executive Summary

The Professional Engineers Government of Ontario (PEGO) is the professional association representing in-house engineering and land surveying experts who work in the Ontario Public Service (OPS), delivering Ontario's priority infrastructure projects and managing the operations of an estimated \$85 billion worth of Ontario's assets. PEGO members work in eleven ministries/agencies and perform critical project management and enforcement roles related to the provincial highway network, the Ontario Building Code, land surveying, food and workplace safety, clean air, and safe drinking water.

This paper will address how increased pressures faced by the Ontario government's in-house engineers are creating delays in delivering the Government's ambitious \$185 billion capital infrastructure plan and in maintaining the existing built infrastructure that Ontario's economy relies on everyday. This is a problem unsolvable through increased outsourcing or using contract engineering firms, and in fact, the evidence points to the increasing use of third-party engineering for tasks that used to be done in-house is making projects more expensive to taxpayers.

While the purpose of outsourcing is normally to transfer risk, access specialized expertise and relieve pressure on internal resources, this is not being wholly achieved as in-house engineers are being required to correct and modify outsourced work to avoid costly contract disputes and project delays. The Ontario Government is taking on far more risk than it means to, and the market incentives, regardless of contract model, designed to keep projects on time and on budget have not been able to reliably prevent cost escalation and delays. Profit-driven firms predictably use any mechanism possible to prevent the realization of lost revenue, avoiding the pressure points that the Government depends on for keeping these service providers on course.

While some proportion of outsourced engineering services are expected to continue, functions including the leadership in project management and procurement of major infrastructure projects, directing consultant engineering work, writing provincial specifications, developing standards and manuals for engineering practice by government service providers all must – by definition – be done by in-house expertise. Simply put, in-house engineers are needed to properly develop project scope, direct projects, conduct negotiations with contractors including consulting engineers, to ensure value-for-money as well as to ensure satisfactory completion of contractual requirements.

It is also important to note that PEGO members perform specialized engineering and land surveying roles, write the codes that govern building and bridge design in Ontario, regulate environmental compliance of industry and work to ensure the safe and secure operation of mines, water treatment facilities and vital telecommunication networks – as just some examples. Many of these public protection functions are roles that cannot be outsourced or contracted and should logically be kept within the span of control afforded by the public sector.

Unfortunately, the ability for in-house experts to complete these necessary functions is being eroded by a steady out-flow of departing talent from the OPS. These departures have stretched government organizations beyond their capacity to deliver on the Ontario Government's mandate and challenged the government's ability to retain institutional knowledge in specialized fields. There are simply not enough engineers and surveyors remaining to perform the necessary work to launch procurements, manage and direct government engineering projects and get shovels in the ground on priority infrastructure projects. This breakdown of the government's ability to deliver high quality engineering for Ontario has progressed despite years of warning by in-house engineers and PEGO.

As we show in this paper, the under-resourced in-house engineering expertise has led – and will continue to lead – to increased project costs, multi-year project delays and a bottleneck of projects that need to be designed and built. Simply put, the government's infrastructure agenda and its obligations to keep our existing infrastructure safe and in good working order is hampered by misjudged expectations of the scope and breadth of engineering services suitable for outsourcing with a corresponding under-resourcing of in-house expertise.

In this paper PEGO lays out practically achievable short-term solutions to address engineering and surveying retention issues and proposes the re-staffing of many engineering functions to sustainable levels that align with the needs of government programs.

PEGO's proposed recommendations would *not* result in increased costs to the treasury, but in fact would save the taxpayers money and place greater decision-making ability for the long-term that the Government needs back in its own hands.

PEGO recommends that the Government of Ontario:

- 1) **Immediately commence a review of engineering staffing needs** in the core Ministries involved in planning and executing the \$185 billion capital plan to determine the appropriate or optimal in-house staff engineering complement needed to execute on this plan. This plan should include a recruitment and retention strategy to address current and expected needs in delivery on the capital plan.
- 2) **Provide labour stability and retain a highly qualified workforce**, by implementing a permanent long-term market alignment mechanism for PEGO members' compensation.
- 3) **Create an Office of Engineering Quality Assurance** to perform the work of engineering oversight under the Owner Acceptance quality model. The Ministry of Transportation

could perform its mandate of ensuring quality construction more capably and efficiently through the adequate staffing of engineers performing these roles.

- 4) **Ensure professional engineers are given the authority to make engineering decisions** by reviewing the Ministry's framework for decision making in design and construction within the scope of professional practice. Ensure accountability mechanisms are in place for decisions made.

PEGO and PEGO-represented Professional Engineers employed in the Ontario Public Service are interested in a partnership with the Ontario government that will help it realize its ambitious and transformative infrastructure agenda. **Only by working together will we achieve our objectives.**

Engineering Ontario’s Ambitious Capital Plan & the Role of PEGO Members

PEGO members work in eleven ministries/agencies and perform essential project management and enforcement roles related to the provincial highway network, the Ontario Building Code, land surveying, food and workplace safety, clean air, and safe drinking water. PEGO-represented engineers inspect Ontario’s bridges, and oversee work in Ontario’s mines, water/wastewater treatment plants, and workplaces. PEGO members are responsible for providing engineering expertise on commercial vehicle standards, agriculture, and forensic fire investigations. PEGO members are responsible for managing the operations of an estimated \$85 billion worth of Ontario’s assets in terms of highways and bridges alone. ¹

The Ontario government has put forward the most ambitious capital plan in the province’s history. Totalling at least \$185.0 billion over ten years, the plan includes \$20.7 billion in 2023–24 alone for highways, GO Transit, subways, hospitals, long-term care, schools and broadband expansion.² These are critical investments that are necessary and long overdue to serve Ontario’s growing population, which is expected to increase 43.6% in the next 24 years to almost 21.7 million people.³

To build these important infrastructure projects, Ontario will require an “all-hands-on-deck”, war time-like effort, putting the necessary resources in place to get projects done. This includes sufficient in-house staff and expertise, as well as external service providers and talent from around the world.

The engineering functions performed within the OPS are a critical part of the delivery of public infrastructure. These functions, completed by PEGO members, include project management and procurement of major infrastructure projects, including leading some of the largest public-private partnership (P3) projects in the province, such as the **Bradford Bypass, Highway 413, the twinning of the Garden City Skyway**, and the replacement of the **Ottawa Queensway bridges** just to name a few. PEGO engineers write provincial specifications, develop standards and manuals for use by the government’s engineering service providers and enforce these standards through project management oversight, inspection, and audit roles.

Experienced and knowledgeable in-house engineers are needed with a broad view of government priorities and are best positioned to ensure taxpayers are getting a fair deal and compliance on complex infrastructure contracts. In other words, it takes engineers to develop engineering and construction contracts, understand the content and represent the government’s interest in public infrastructure contracts.

In addition to project-based roles, many government engineering positions require deep institutional knowledge often gathered over decades of experience. Losing this talent is often

¹ <https://www.fao-on.org/en/Blog/Publications/provincial-infrastructure-2020>

² <https://budget.ontario.ca/2024/chapter-1a.html>

³ <https://www.ontario.ca/page/ontario-population-projections>

impossible to replace and the turnover of these staff does a massive disservice to the public causing further delays to critical projects or an inability to maintain existing technical infrastructure. For example, several ministries have single incumbent positions such as the Lead Network Engineer responsible to provide “engineering and technology expertise for the selection, implementation and ongoing support of a province wide public safety radio network for first responders and other public safety user groups.”⁴ Positions such as these require extensive experience and continuity and cannot be effectively managed by a constant turnover of staff or replaced by short term contracts.

While major infrastructure projects nearly always require outside engineering support for specific functions, a core group of PEGO engineers working inside the OPS are necessary to keep projects on-track. The intended outcome of outsourcing is to transfer risk, access specialized expertise and relieve pressure on internal resources, however these outcomes cannot be achieved without the direction of in-house engineers, who are relied on by outside contractors throughout the procurement, planning, construction, and testing phases of projects.

A “One-team” Approach to Infrastructure Project Management

Across all public sectors, not just in Ontario, big infrastructure projects are taking longer than necessary and cost overruns are all too common. In one influential study by Bent Flyvbjerg, an expert in project management at Oxford University’s business school, an estimated nine out of ten “megaprojects” – those that cost \$1 billion or more – go over budget.⁵

Experts say that the solution to this problem is, in large part, to invest in more careful project planning and engineering early in the process so that the project specifications are precise and accurate before they go to the contractors who do the physical work. As McKinsey Consulting’s whitepaper on megaprojects notes, one of the keys to a successful project is to:

*Do the engineering and risk analysis before starting construction. This is often stated but rarely followed, though doing so clearly improves project performance. Edward Merrow, the founder of the Independent Project Analysis consultancy and author of a book on megaprojects, has shown that the best examples of project-definition work reduce both project timelines and costs by roughly 20 percent.*⁶

That “project-definition work” cited by Edward Merrow and the McKinsey paper must, almost by definition, be done mostly by in-house engineers. But Ontario presently lacks the number of engineers to do this work. The result: project definition work and scoping are either not done,

⁴ Lead Network Engineer/ Radio Network Engineer Standardized Job Description, April 2021

⁵ Bent Flyvbjerg, “What you should know about megaprojects and why: An Overview”, Project Management Journal, February 2014.

⁶ <https://www.mckinsey.com/capabilities/operations/our-insights/megaprojects-the-good-the-bad-and-the-better>

not done with sufficient rigour or it too is outsourced to the very firms expected to bid on the work. This can in turn result in a lack of control over project outcomes and may create an inherent and expensive conflict of interest if the same firms are not excluded from bidding the very same work they had scoped.

Ontario Power Generation (OPG) is an example from Ontario's own backyard where this model of careful planning and integrated in-house engineering talent led to a successful outcome. In the refurbishment of Darlington Unit 3, OPG's in-house engineering talent took a "one-team" approach with its specialized contractors and delivered the project 169 days ahead of schedule and on-budget.⁷ OPG attributes the success to a number of key factors including:

- *Planning: OPG conducted thorough planning prior to starting project execution, including building a full-scale nuclear reactor mock-up. At this first-of-its-kind facility, workers practise tasks in a simulated environment prior to performing the exact manoeuvre on the reactor. A portion of this planning may also be applied to future projects.*
- *"One Team" approach: OPG and its project partners, including technical staff and skilled tradespeople, are all part of one organization, working toward the same goals around safety, quality, schedule, and cost. The team also constantly shares and incorporates lessons learned from each stage.*
- *A "made-in-Ontario" approach: OPG and its partners are leveraging Ontario's robust nuclear supply chain for the parts and services needed for Darlington's refurbishment. Approximately 96 per cent of project costs are being spent in the province, including with more than 260 companies. The \$12.8B Refurbishment project, together with the station's extended operation, will generate approximately \$90 billion in economic benefits for Ontario and create an average of 14,200 jobs annually across the province.*

Contrast this good news story with the all-too-well-known and notorious story of the Eglinton Crosstown LRT project where deficiencies have plagued the opening of the line. Fixing the mistakes that could have been addressed earlier has caused years of delay and litigation that will likely cost in the hundreds of millions of dollars.⁸ The Ministry of Transportation Ontario (MTO) is likewise struggling to get the newly purchased Amherst Island and Wolfe Island ferries into service, despite an earlier statement that they were expected to be operational in 2020

⁷ <https://www.newswire.ca/news-releases/darlington-refurbishment-is-a-made-in-ontario-success-story-838877197.html>

⁸ <https://toronto.citynews.ca/2023/04/27/eglinton-crosstown-opening-construction-caroline-mulroney/>

and 2021 respectively.⁹ In March 2024, it was reported that “the Amherst Islander II (AI2) has yet to transport its first passenger.”¹⁰

In summary, it is clear that having adequate in-house engineering talent in place is critical to project success and will be needed for Ontario to achieve its ambitious infrastructure agenda.

Engineering Oversight for Public Infrastructure

There’s an industry saying that goes “you get what you inspect, not what you expect”. When it comes to the province’s multi-billion-dollar transportation infrastructure program, there is a pressing need to ensure dollars are being spent properly and the government, as well as taxpayers, are getting value for what they pay for.

MTO has gone through several iterations of construction oversight models, with the most recent regime including an “Owner Acceptance” model where the work is approved by the owner instead of acceptance for quality being managed directly by builders. The latter approach was widely scrutinized by the Auditor General in a 2016 report. At that time the auditor demonstrated that “it is the contractors, not the Ministry, that hire the professional engineers responsible for certifying that construction of structures (such as bridges) adheres to required standards. A few of these engineers have certified that construction, that was subsequently found to be unsafe, was in compliance with the standards.”¹¹

In the Auditor General’s 2018 follow up report, the AG recommended that the Ministry “should hire or contract its own engineers who are independent from the contractors to perform verification activities.”¹² This was noted to be completed in the follow up report, yet the Ministry has less than a handful of Quality Assurance Engineers province wide that perform the work of inspecting and auditing construction of highways and bridges. In 2022-23 alone, “the improvement of approximately 551 centreline-kilometre of provincial highway and 108 bridges was completed. In addition, 120 lane-kilometre of new/widened highway and 11 new bridges were completed in 2022-23.”¹³ It is readily apparent that the handful of in-house Quality Assurance Engineers cannot perform the inspection and audit function needed for that extent of construction work – and their workload is about to get a lot bigger!

To supplement the lack of internal staff, the Ministry “effective April 2018, replaced the QVEs’ [Quality Verification Engineers] certification process with a new process whereby compliance with contract specifications is to be completed by Ministry staff and/or consultants retained by

⁹ <https://news.ontario.ca/en/release/48665/ontario-building-fully-electric-ferries-for-wolfe-and-amherst-islands>

¹⁰ <https://www.cbc.ca/news/canada/ottawa/wolfe-islander-amherst-islander-new-ferries-still-not-in-service-mto-1.7147669>

¹¹ https://www.auditor.on.ca/en/content/annualreports/arreports/en16/v1_310en16.pdf

¹² https://www.auditor.on.ca/en/content/annualreports/arreports/en18/v2_110en18.pdf

¹³ <https://www.ontario.ca/page/published-plans-and-annual-reports-2023-2024-ministry-transportation#section-5>

the Ministry.”¹² As a direct consequence of understaffing of in-house Quality Assurance Engineers, the owner acceptance model consists of the vast majority of onsite construction oversight work being outsourced to Contract Administrators. Contract Administrators are third party firms that perform the role of day-to-day administration of overseeing construction projects. Contract Administrators and their construction inspectors are professionals in their own right, but the construction oversight of MTO infrastructure by engineers was effectively removed and replaced by non-engineers.

Even following one of the most colossal failures in MTO’s history where the Nipigon River Bridge lifted off its support, oversight remains largely in the hands of non-engineers. Following the failure, PEGO in 2016 reported on the investigation and urged the government to provide engineering resources required to ensure the required level of oversight.¹⁴ The Auditor General said at the time that “the failure shouldn’t have been a surprise: the government’s procedures for contracting work and for ensuring the quality and safety of roads and bridges made it, or something like it, more likely”¹⁵, because of the inherent conflict of interest that exists because the contractors are not adequately supervised.

PEGO contends that an adequate level of reliability cannot be achieved under the outsourced inspection model without significantly increasing the number of in-house engineers with specialized experience to provide the expert detailed oversight that the ministry needs. Simply put, for the owner acceptance model to work effectively, the owner (MTO) needs to employ the right professionals with the know-how to properly assess and sign off that the work was completed per the plans.

Engineers should make engineering decisions

Major decisions related to design changes, testing and evaluation, and acceptance of work in MTO construction projects are the responsibility of non-engineering technical staff. In some cases, this has led to disaster. In one case, a 2021 court bulletin detailed an incident where a worker was tragically killed due to failure to abide by engineering procedures:

- *A geotechnical engineering report obtained in advance of movement of the bridge, as required by the MTO contract, approved of the location of bridge support bearing pads at specified locations where the composition and contours of the soil could support them. The cribbing towers, however, were erected on ground that had not been analyzed in the engineering process and was adjacent to sloped ground.*
- *Coordination of the jacking process was controlled by the supervisor. A mechanical means of coordination – for example, a central hydraulic line going to*

¹⁴ <https://pego.on.ca/time-for-oversight/>

¹⁵ <https://www.tvos.org/article/ontario-is-spending-billions-on-infrastructure-badly>

both sides of each end of the bridge – would have allowed even, coordinated and level movement of the structure without reliance on an individual’s perception and direction to multiple workers as to the pace of jack movement at each location.

- *Approval was obtained from the MTO for the installation of the bridge based on submitted engineering documents. The approved process required excavation of the launching side of the creek for assembly of the bridge modules so that when the bridge was pushed across the creek, it would only need to be jacked down about 13-1/2 inches. However, the bridge was assembled at road grade, so that when it was in place over the concrete support pads, it was on cribbing towers over 1.4 metres high, requiring considerably more jacking stages over a much greater distance.¹⁶*

Various parallels can be drawn from the broader industry and one such recent example is that of Boeing. While the famously coined expression “If it’s not Boeing, I’m not going” and reputation for reliability became a hallmark of the brand, the company has clearly suffered a massive blow in public confidence of late. With corporate changes and a focus on outsourcing, the modifications made to the flagship 737 resulted in tragic avoidable crashes.¹⁷ As reported in the Harvard Business Review in 2014, “before its 1997 merger with McDonnell Douglas, Boeing had an engineering-driven culture...McDonnell Douglas, on the other hand, was ... focused on cost cutting and financial performance, and its culture came to dominate the merged company.”¹⁸

The report goes on to say, “Just as the engineers had predicted, the result was huge delays and runaway costs”. Hart-Smith, retired aerospace engineer and former senior technical fellow at Boeing, had warned against excessive out-sourcing in his 2001 paper because it was not only inefficient but also it was not profitable for the company.¹⁹ Boeing didn’t listen, and both the company and the public paid the price.

In engineering driven fields such as highway and bridge design, PEGO asserts that clear decision-making processes are needed that put government officials in the best position to make effective decisions. This translates to qualified competent individuals with the specialized knowledge, expertise, and judgement – all hallmark qualities of engineers. PEGO engineers

¹⁶ <https://news.ontario.ca/en/court/1000511/workers-death-from-collapsing-bridge-results-in-175000-fine-for-chelmsford-construction-company>

¹⁷ <https://www.forbes.com/sites/gautammukunda/2024/02/22/let-the-engineers-lead-america-needs-boeing-to-be-great/>

¹⁸ <https://hbr.org/2014/06/the-price-of-wall-streets-power>

¹⁹ Hart-Smith, L.J., 2001. OUT-SOURCED PROFITS – THE CORNERSTONE OF SUCCESSFUL SUBCONTRACTING. Boeing Third Annual Technical Excellence (TATE) Symposium, St. Louis, Missouri.

want to see the government’s infrastructure agenda succeed; we don’t want the doors blowing off the province’s infrastructure plan.

Current State of In-House Engineering in the Ontario Public Sector

As an essential partner in delivering on Ontario’s commitments, engineers within the OPS simply do not have the resources necessary to get the job done, and the shrinking size of the pool of in-house engineering experts, is not keeping pace with the rapid growth of Ontario’s population, or the demands being placed on engineers. Scarce resources are being stretched between priorities and significant delays have become normalized, with this state expected to persist or worsen in the coming years unless policy changes.

Take for example, the massive expansion in highway infrastructure which has continued over the past number of years without a corresponding addition of engineering staff to oversee the network. Looking at the Auditor General’s 2021 Value-for-Money Audit reports, it is clear that expansion of the program cannot be understated. The auditor reported:

“Since 2007/08, the Ministry of Transportation and the Ministry of Northern Development, Mines, Natural Resources and Forestry have budgeted over \$7.5 billion on the maintenance, operation and expansion of Ontario’s network of transportation structures, mainly bridges and culverts. Annual funding for these structures increased by over 700%, from \$93 million in 2007/08 to \$754 million in 2021/22.”²⁰

The increased workload, shrinking team and frozen compensation is causing existing staff to leave or contemplate early retirement, exacerbating the shortage of engineering talent. To deal with the additional workload, MTO officials have outsourced more and more functions to private engineering firms, but without a commensurate balance of in-house staff leading or managing these projects, the success of this approach has not proven to be effective or resulted in good value for money. Lack of proper oversight and direction during the design process can result in construction claims orders of magnitude higher than the costs of the engineering work. The Auditor General reported that “head-office” claims increased 200% from 2012 to 2015 in addition to hundreds of construction claims filed at the regional and field level.²¹ The report goes on to say that Contractors were able to avoid paying fines for years at a times and “delays were due to the increased volume of claims to be reviewed”.²²

In parallel, government spending on engineering service providers for the Ministry of Transportation has reached its highest ever in 2022-2023 with over \$450 million according to

²⁰ https://www.auditor.on.ca/en/content/annualreports/arreports/en21/AR_InspectBridges_en21.pdf

²¹ https://www.auditor.on.ca/en/content/annualreports/arreports/en16/v1_310en16.pdf

²² Ibid

the Public Accounts of Ontario.²³ In 2017-18, one engineering firm alone was paid \$78 million for engineering services, more than the entire annual cost of the government’s in-house engineers across all OPS ministries/agencies where PEGO members work.²⁴ At the same time, the entire annual cost of PEGO engineers across all government ministries is approximately \$75 million, roughly the same real cost to the government as in 2014, not considering inflationary increases, according to internal PEGO records. This translates to an overall reduction in spending on government engineering resources while both engineering service providers and program expenditures have gone up significantly. While the necessary role of outside engineering contractors has been noted, many of the skills required for these arrangements can be performed by in-house engineers, and at much less expensive rates, should the current gaps be addressed.

The persistent under-resourcing of in-house engineering expertise and the significant wage competition from other levels of government and the private sector has resulted in a flight of engineering talent from the OPS – a trend that is accelerating in recent years. Gaps in public service engineering talent, resulting from employees leaving and difficulties and delays in recruiting new talent, are causing backlogs in delivering Ontario’s priority infrastructure projects.

To meet the government’s infrastructure goals and maintenance requirements, the departure of needed expertise out of the OPS must be reversed to prevent the inevitable project delays and additional costs that will result.

While outsourcing is relied on to compensate for these gaps, external engineering service providers depend on stability of expert OPS project management staff to keep projects on track. Government needs engineers to review and assess the engineering deliverables provided by private sector partners in order to make project decisions and provide direction. Increased outsourcing is not a sustainable solution to address capacity needs within the OPS. To meet the government’s infrastructure goals and maintenance requirements, the departure of needed expertise out of the OPS must be reversed to prevent the inevitable project delays and additional costs that will result. Look no further than the increase in transportation project costs which has significantly outpaced inflation in recent years making infrastructure project budgets difficult to forecast and plan. The Ministry of Transportation’s Tender Price Index increased by 18% for the combined years of 2022 and 2023 or nearly double the rate of inflation.²⁵

²³ Public Accounts 2022-23 Detailed Schedules of Payments <https://www.ontario.ca/page/public-accounts-2022-23-detailed-schedules-payments>

²⁴ Public Accounts 2017-18: Volume 3 Detailed Schedules of Payments <https://www.ontario.ca/page/public-accounts-2017-18-volume-3>

²⁵ Ministry of Transportation “Cost Estimating Guide for Designers” May 2023

While a return to a baseline proportion of in-house engineers is necessary to meet program needs, PEGO members have even more to offer in terms of value creation. In-house capacity with adequate experience is required to maintain the goal of being a knowledgeable owner to provide government with alternative solutions and a value-for-money lens on outside proposals. Without this support, the Ontario government is left to rely on prices and timelines imposed by a limited number of capable bidders for projects that could have been completed faster and more cost effectively by a well staffed regiment of in-house engineers working on project design improvements. PEGO would welcome a rigorous review of engineering expenditures across the board to assess the effectiveness of the current engineering delivery structures in government.

Below market compensation will continue to drive in-house engineering talent away, creating a feedback cycle where the remaining OPS engineers are being incentivized to advance their careers outside the public service at higher salaries than are available in the OPS. This has produced the unintended consequence of making government engineering and land surveying positions a subsidized training program for private sector firms. This is also making it difficult to recruit new engineers with the necessary specialized talent, especially at senior levels. The government is rapidly losing its best engineering resources and are left with no alternative but to rely on outside contracting contracts who often set the price without balanced competition. It is becoming a self-fulfilling loop that the less resources devoted to maintaining and hiring new in-house talent, the more reliant the government becomes on outsourcing, which acts as a further disincentive for engineers to stay with the public service and drives cost upward. Internal PEGO records show that **new hires have not kept pace with the combined number of departures from 2019 to 2023.**

Between 2019 and 2023, there were 262 permanent departures from MTO, and there were only 236 new hires.

Below market compensation will continue to drive in-house engineering talent away, creating a feedback cycle where the remaining OPS engineers are being incentivized to advance their careers outside the public service at higher salaries than are available in the OPS. This has produced the unintended consequence of making government engineering and land surveying positions a subsidized training program for private sector firms.

Moreover, the Ministry of Transportation has not been able to keep up with the consulting engineering industry and the construction/contracting industry demand for a “pipeline” of projects in order to maintain their own teams of expertise and pace projects to fit their availability. Because of the lack of in-house resources in the OPS, required to manage the pipeline of projects, many transportation projects have slid further into the future. This is evident from both the Northern and Southern Highways Program that publish the provincial construction plans with target completion dates. Projects such as the Hwy 7N Grand River Bridges were targeted for completion in 2020 per the 2017-2021 Southern Highways Program, yet these projects have yet to start construction.²⁶ **When project teams or entire departments go under resourced, delay is sure to result.**

Without completed engineering projects “on-the-shelf”, the Ministry of Transportation will continue to under-deliver. In fact, an Engineering Delivery Enhancement Initiative was struck from 2015-2018 with the specific aim of getting projects out to construction faster by reducing the engineering effort required by service providers. Even then, the MTO was not able to develop a pipeline of projects but fell even further behind on the delivery of major expansion projects such as the new Hwy 6 bypass around Morriston. A 2016 announcement that the bypass would move forward has led to increasing frustration and pleas from the township for progress to be made.²⁷ The Auditor General’s Value-for-Money Audit: Highway Planning and Management (November 2022) notes the project as a “deferred project previously approved for planning and design”.²⁸

Outside observers have similarly identified the imbalance of in-house resources and the over-reliance on contracted engineering services. This problem has escalated and intensified in recent years, but its roots go back more than a decade. As far back as 2015, an arbitration decision between PEGO and MTO stated:

“..it appears that the [Provincial Highways Management] division is facing different challenges which, curiously, might be described as an embarrassment of riches coupled with a poverty of staff. Significant public resources (\$2.5 billion for 2014-2015) have been committed to highway rehabilitation and expansion projects across the province. There has, however, been no corresponding increase (perhaps even a reduction) in staff.”²⁹

²⁶ Ministry of Transportation Southern Highways Program, 2017-2021
<https://kitchener.ctvnews.ca/province-reveals-bridge-designs-as-part-of-long-delayed-hwy-7-expansion-1.6582193>

²⁷ <https://news.ontario.ca/en/release/36300/ontario-moving-forward-on-morriston-bypass>
<https://www.guelphtoday.com/local-news/puslinch-once-again-urging-for-progress-on-morriston-bypass-7099138>

²⁸ https://auditor.on.ca/en/content/annualreports/arreports/en22/AR_ProvHighways_en22.pdf

²⁹ Grievance Settlement Board Decision# 2014-2260 (Herlich)

The provincial budget allocation for highway work has only continued to increase where “MTO committed about \$3.0 billion in 2022-23 to repair and expand provincial highways and bridges across Ontario.”³⁰ At the same time the highway budget pales in comparison to the transit budget at nearly three times that amount of \$7.7 billion for the same period.³¹ Of note, Metrolinx does not have a single PEGO engineer working in their agency.

OPS Engineers and Land Surveyors by the Numbers

The Ontario government's current engineering staffing levels are lacking. A critical review of engineering service levels is required in order to successfully and safely deliver on the routine work of the government and its ambitious infrastructure development agenda.

Losing the institutional knowledge and experience held by in-house engineers is exposing Ontario to more project risk in addition to costing Ontario taxpayers more money in inflated contract values and costly project delays.

PEGO members believe Ontarians deserve better and do not want to see the Ontario government continue to fail to meet project timelines or public commitments due to the under-resourcing of its own stated priorities.

Currently, the OPS employs approximately 620 engineers and 25 Ontario Land Surveyors (OLSs) within the PEGO membership³². A 350-member majority work in the Ministry of Transportation, and 130 members work in the Ministry of Environment, Conservation and Parks (MECP). However, this 350-member majority at MTO is misleading, as at any given point in time 80 to 90 of those members are unlicensed engineering graduates – meaning that they have recently graduated and have not yet completed the required 4 years of experience to become a licensed Professional Engineer (P.Eng.). In reality, the MTO has a scant 250 licensed Professional Engineers represented by PEGO to deliver on its regular capital program, its annual maintenance program, and to deliver an ambitious highway development program including: the Bradford Bypass, Highway 413, the St. Thomas battery plant Highway 3 expansion, the Toronto expressway upload, and Ottawa expressway upload, the Garden City Skyway twinning, etc.

If 250 Professional Engineers do not sound like enough for the provincial highway network in a province as vast as Ontario, that’s because it isn’t. For comparison, Quebec employs 1,950

³⁰ <https://www.ontario.ca/page/published-plans-and-annual-reports-2023-2024-ministry-transportation>

³¹ <https://assets.metrolinx.com/image/upload/v1663232126/Documents/Metrolinx/2022-23-Business-Plan-Final-English-Version.pdf>

³²PEGO dues list

professional engineers in their APIGQ bargaining unit³³, of which approximately 1,200 engineers work for the Quebec Ministry of Transportation and Sustainable Mobility³⁴. This is a major discrepancy between two comparable neighbouring provinces with very similar highway infrastructure needs. MTO engineers are required to provide oversight of more than 4x the infrastructure by highway centreline kilometre when compared to Quebec.

Province	Population	Highway Centreline kms	Transportation Ministry Engineers	km per Transportation Ministry Engineer
Ontario	15.5 million ³⁵	16,900 ³⁶	250	67.6
Quebec	8.5 million ³⁷	20,000 ³⁸	1200	16.7

Outside of transportation needs, Quebec has approximately 750 APIGQ engineers working for the remainder of the government of Quebec. Ontario by contrast has only 270 engineers spread around 10 ministries/agencies outside of the MTO. It is noteworthy that the Ministry of Infrastructure and its agency, Infrastructure Ontario, list only two PEGO-represented engineers on its public roster – both of whom are telecommunications engineers – despite this Ministry's involvement in the procurement of Ontario's largest civil engineering infrastructure projects³⁹. Similarly, Metrolinx has no PEGO-represented engineers.

In response to a then Ministry of Transportation Quebec (MTQ) report on collusion in September 2011⁴⁰ and the start of the Charbonneau Commission in the following October, MTQ hired an additional 330 engineers⁴¹ – a number which is still 80 engineers higher than the MTO's current 2024 complement of licensed professionals. That report identified several organizational issues that served as preconditions to collusive activity that are present in how MTO currently delivers its own agenda: an outsized reliance on private engineering firms; a reliance on under-experienced engineering staff coupled with an employee retention problem rooted in non-competitive pay; and a scale of government program delivery that forced sometimes inexperienced engineering staff to focus too much on contract preparation and contract oversight of too many concurrent projects to the detriment of adequate risk

³³<https://www.apigq.qc.ca/#>

³⁴<https://montreal.ctvnews.ca/quebec-reaches-agreement-with-government-engineers-strike-ends-1.5993641>

³⁵[Population estimates, quarterly \(statcan.gc.ca\)](https://www150.statcan.gc.ca/n1/pub/28-263-x/2019001/article/00001-eng.htm)

³⁶[SydneyEnterprise: Portal \(gov.on.ca\)](https://www150.statcan.gc.ca/n1/pub/28-263-x/2019001/article/00001-eng.htm)

³⁷[Population and dwelling counts: Canada, provinces and territories \(statcan.gc.ca\)](https://www150.statcan.gc.ca/n1/pub/28-263-x/2019001/article/00001-eng.htm)

³⁸https://en.wikipedia.org/wiki/Highways_in_Quebec

³⁹<https://www.infogo.gov.on.ca/org?id=187258&b=c2VhcmNodHlwZT0xJnNvcnRkaXI9YXNjJnNvcnRjb2w9UmFuaYz0b3Bvcmc9MCMzYmV5d29yZHM9dGVsZWV5bW11bmljYXRpb25zJnNvcnR5Ym91bD1zb3J0LW9wdGlvbjAmbG9jYWxlPWVvJmpvYj0w>

⁴⁰<https://www.apigq.qc.ca/wp-content/uploads/2021/04/2011-09-rapport-de-lunite-anticollusion.pdf>

⁴¹<https://www.apigq.qc.ca/apigq/historique/#h2-item-9>

management and elimination of technical errors before work goes to tender. For clarity, this paper does not suggest any collusive activity at the MTO – the comparison is in the staffing numbers and the issues.

To answer the question of how many engineers is enough requires the focused and critical attention of many parts of government to understand its needs and the public's needs with respect to the regulated concerns of the engineering profession regarding life, health, economic interests, public welfare, and the environment.

Recommendations

To improve upon the delivery of engineering services for Ontario infrastructure projects and address gaps being created by the ever-increasing departure of engineering talent from the OPS, we propose and recommend that the Ontario government undertake the following:

- 1) **Immediately commence a review of engineering staffing needs** in the core Ministries involved in planning and executing the \$185 billion capital plan to determine the appropriate or optimal in-house staff engineering complement needed to execute on this plan. This plan should include a recruitment and retention strategy to address current and expected needs in delivery on the capital plan.

Benefits to the Ontario Government:

- With additional resources, the OPS can restore its capacity to a stable level affording in-house engineers time for advanced planning and the ability to direct and review projects with a value-for-money lens and minimizing user disruption.
- Having access to greater in-house resources will immediately reduce Ministries' overall engineering spend and allow for more of that budget to be focused on particular skills or expertise that might not exist in-house.
- Projects currently "on the shelf" for lack of resources could be unlocked with a view to getting more out the door to tender and construction and a more consistent "pipeline" for construction contractors could be realized.

- 2) **Provide labour stability and retain a highly qualified workforce**, by implementing a permanent long-term market alignment mechanism for PEGO members' compensation.

Benefits to the Ontario Government:

- With greater stability in the engineering talent pool, there will be less turnover of staff – which itself has a positive economic and performance impact.
- With more competitive wages, more competent engineering talent can be recruited and retained, leading to higher quality outcomes.

- With more competitive wages, there will be less flight of high-quality engineers who build skills in the OPS and then move to consulting engineering firms where they perform their old jobs – often contracted back to the OPS - at higher rates.
- Most importantly, having in-house competencies will lead to better projects overall, leading to a better outcome for taxpayers.

3) **Create an Office of Engineering Quality Assurance** to perform the work of engineering oversight under the Owner Acceptance quality model. The Ministry of Transportation could perform its mandate of ensuring quality construction more capably and efficiently through the adequate staffing of engineers performing these roles.

Benefits to the Ontario Government:

- Reinstates construction oversight by engineers on complex construction projects such as bridges and other highway structures to improve safety and construction quality.
- Increases the ability to deploy specialized quality assurance engineers to multiple projects multiplying the enhanced oversight completed by these professionals.
- Reduces administrative burden for the repeated procurement of services that are a constant, perpetual need.

4) **Ensure professional engineers are given the authority to make engineering decisions** by reviewing the Ministry's framework for decision making in design and construction within the scope of professional practice. Ensure accountability mechanisms are in place for decisions made.

Benefits to the Ontario Government:

- Major financial and safety related decisions on infrastructure should be made by the professionals that have the requisite knowledge and expertise.
- Avoids group think and consensus type decision making by unqualified persons.
- In-house engineers focus on the best long-term value for government assets resulting in overall life cycle cost savings.

Conclusion

PEGO contends that many specialized engineering and surveying roles can only practically be completed by in-house staff because of their specialized nature, or the role involves project scoping, standard setting or other functions exclusively reserved for a government. In-house engineers are in the best position to do threat assessments and perform systemic risk management duties, critical functions of any government, particularly in its regulatory oversight function.

Outside contractors also look to in-house engineers to make project decisions throughout the procurement, planning, construction and testing phases of projects, and the faster these decisions are made, the faster the contractor can complete the work and get paid.

Gaps in public service expertise, resulting from engineering talent leaving and difficulties in recruiting new expertise, are causing backlogs in delivery of these priority infrastructure projects – a result that is hurting the contractors, the taxpayers and the public demanding completion of the infrastructure. While some outsourcing and contracting and will always continue to be necessary to meet complex project goals, having adequate in-house resources to partner with these contract partners is critical to success of the project and successful execution of the contracts.

In-house engineers are in the best position to do threat assessments and perform systemic risk management duties, critical functions of any government, particularly in its regulatory oversight function.

In short, it is clear that in-house engineers and land surveyors are a critical partner in delivering on Ontario’s infrastructure commitments. To build these important infrastructure projects, Ontario will require an “all-hands-on-deck”, wartime-like effort, putting the necessary resources in place to get projects done.

A well-staffed and highly qualified in-house team of engineering experts makes government a better and more collaborative customer for the outsourced contracting partners and construction companies that will continue to provide much of the services that Ontario needs to fulfill its infrastructure mandate.

PEGO and PEGO-represented Professional Engineers employed in the Ontario Public Service are interested in a partnership with the Ontario government that will help it realize its ambitious and transformative infrastructure agenda. **Only by working together will we achieve our objectives.**