

STONEY CNG BUS STORAGE AND TRANSIT FACILITY, CITY OF CALGARY

BUILDING THE FOUNDATION FOR A MORE SUSTAINABLE TRANSIT FUTURE



THE CANADIAN COUNCIL FOR PUBLIC-PRIVATE PARTNERSHIPS
2019 NATIONAL AWARD CASE STUDY

The Canadian Council for
Public-Private Partnerships



Le Conseil Canadien pour
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The Canadian Council for Public-Private Partnerships
2019 National Award Case Studies

Silver Award for Infrastructure:
Stoney CNG Bus Storage and Transit Facility

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Photos courtesy of City of Calgary

Introduction

For nearly 30 years, The Canadian Council for Public-Private Partnerships and its members from the public and private sectors have played a strong role in refining the P3 model and promoting new approaches to infrastructure development and service delivery.

Governments across Canada are using the public-private partnership (P3) model to build, maintain and operate much-needed infrastructure, from schools and hospitals to bridges and highways. In 2020, there are 288 active P3 projects in operation or under construction valued at \$139.4 billion.¹

Along the way, the ‘made-in-Canada’ P3 model has become globally renowned but, as the winners of the 2019 National Awards for Innovation and Excellence in Public-Private Partnerships demonstrate, it has never stopped evolving.

This year, CCPPP is publishing three case studies on these exemplary projects, joining the almost 80 that have been published to date. Designed to inspire others to consider innovative and efficient models for procuring infrastructure, the studies highlight many of the lessons learned about P3s. Each case provides a close look at how a successful P3 has worked, including how the partnership was established, its structure and operation and its resulting benefits.

It is important to learn from these complex projects as we move forward. After all, investment in infrastructure is critical for the future of our communities and country because it creates jobs, drives growth, stimulates productivity, and builds a legacy for us to thrive.

Canadians want — and expect — critical infrastructure to be built quickly and with the best value for taxpayers. Using public-private partnerships is an advantage given their fixed price, on-time private sector delivery commitment, risk allocation and improved life cycle maintenance and operations.

In 1998, CCPPP established the National Awards for Innovation and Excellence in Public-Private Partnerships to honour governments and/or public institutions and their private sector partners who have demonstrated excellence and innovation in P3s. Gold, silver and bronze Awards of Merit are given in the areas of project development, financing,

infrastructure, service delivery or other notable attributes to projects from across the country and at all levels of government.

Winning projects are chosen on the basis of the following criteria:

- Innovative features;
- Relevance or significance as a national and/or international model;
- Economic benefit (job creation, enhanced economic value, export potential, etc.);
- Measurable enhancement of quality and excellence of service or project;
- Appropriate allocation of risks, responsibilities and returns between partners; and
- Effective use of financing and/or use of non-traditional sources of revenue.

2019 Award Winners

Gordie Howe International Bridge Project — Gold Award for Project Financing

This international crossing — which will be the longest cable-stayed bridge in North America and the first new major trade link between the United States and Canada in four decades — represents one of the largest recent private financings of a P3 in Canada with a total project cost of CAD\$5.7 billion. The step-up step-down security package provided to lenders is unique and the project is the first Canadian P3 to use a non-traditional foreign exchange risk framework to balance fluctuating currency prices, setting a precedent for future cross-border transactions.

Tłı̄ch̄o All-Season Road — Gold Award for Project Development

This 97-kilometre all-season gravel highway, which will link the remote northern community of Whati with its neighbours in the Northwest Territories, is among the first P3s in North America with an Indigenous government that has a cash-funded equity stake in the project. The project is also notable for its unique approach to handling long-term risks related to climate change, which is happening at an unprecedented rate in the North. Its “bespoke climate change risk-sharing regime” uses cutting-edge modelling, enabling the partners to more efficiently price their

¹ P3 Spectrum, www.p3spectrum.ca, accessed April 20, 2020.

potential exposure to this risk for long-term operations and maintenance of a road constructed above permafrost.

Library and Archives Canada’s Gatineau 2 Project – Silver Award for Project Development

This new flagship building in Gatineau, Que., will be the first “net-zero carbon” facility dedicated to archival preservation in the Americas and the first federal building constructed to the requirements of Canada’s Greening Government Strategy. This will also be the world’s largest preservation facility equipped with a high-tech automated archive storage and retrieval system. Overall, the project will not only ensure Canada’s precious national collections are kept under optimal preservation conditions, but also set a global standard.

The New Toronto Courthouse – Silver Award for Project Development

Construction is underway on Ontario’s first high-rise courthouse in Toronto’s downtown core, which will amalgamate six Ontario Court of Justice criminal courthouse locations in one new, accessible location. The project will improve access to justice and enhance operational efficiencies, as well as commemorate the rich cultural and heritage value of the site. Along with its 63 courtrooms and 10 conference rooms, the 17-storey facility will include improved security features and house the first Indigenous Learning Centre in an Ontario courthouse.

Stoney CNG Bus Storage and Transit Facility – Silver Award for Infrastructure

This gigantic facility near the Calgary International Airport can hold 424 standard 12-metre (40-foot) buses with overflow space for 50 more buses. It is the largest indoor compressed natural gas bus fuelling complex in North America and one of the largest in the world. But not only are the buses using greenhouse gas reducing technology, the facility itself marries cutting-edge technology and environmental design features such as a top-down ventilation design that safely and efficiently removes air contaminants.

Acknowledgements

CCPPP has a team of dedicated Award selection committee volunteers who review the applications, select the winners and provide feedback on the case studies. Using their extensive P3 knowledge and experience, they select the winners from a pool of very qualified applications and then ensure the case studies provide a learning tool for seasoned practitioners, as well as those new to the P3 model. The following panelists comprised the 2019 selection committee:

- Cliff Inskip, Chair of the Awards Selection Committee and President, Polar Star Advisory Services Inc.
 - Shariq Alvi, Managing Director, Infrastructure and Project Finance, CIBC
 - Rupesh Amin, Managing Partner, Infrastructure & Development, Forum Equity Partners
 - Peter Hepburn, Managing Director and Head, Infrastructure and Project Finance, National Bank Financial Markets
 - Alain Massicotte, Partner, Blake Cassels and Graydon LLP
 - Johanne Mullen, Partner and Leader, Canadian Infrastructure and Project Finance Group, PricewaterhouseCoopers LLP
 - Dr. Alan Russell, Professor & Chair, Computer Integrated Design & Construction, Department of Civil Engineering, University of British Columbia
 - Godyne Sibay, Partner, Real Property and Planning Group, McCarthy Tétrault LLP
 - Lindsay Wright, Manager, Global Infrastructure, KPMG LLP
- Deborah Reid and Jennifer Robinson authored the 2019

Award Case Studies, which were developed with significant input and review from the project partners and procurement agencies as well as the diligent work of the researchers. CCPPP would like to thank them for their contributions as well as Infrastructure Canada for its research support for the case studies.



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About CCPPP

Established in 1993, CCPPP is a national not-for-profit non-partisan, member-based organization with broad representation from across the public and private sectors. Our mission is to collaborate with all levels of government, Indigenous communities and the private sector to enable smart, innovative and sustainable approaches to developing and maintaining infrastructure that achieve the best outcomes for Canadians.

Our reports, case studies, guidance and surveys are available on CCPPP's online bookstore at

www.pppcouncil.ca/web/bookstore.

Additional resources include: P3 Spectrum (www.p3spectrum.ca), Canada's premier source for up-to-date P3 project info.

Quick Facts – Stoney CNG Bus Storage and Transit Facility²

Project type

Design, build, finance, maintain (DBFM)

Asset/Service

Design, build, finance and maintain a new bus operating, storage and maintenance facility for Calgary Transit in northeast Calgary. The facility is capable of housing 424 standard 12-metre (40-foot) buses with overflow space for 50 more buses. It also contains 36 maintenance bays, a bus wash system, Calgary Transit's first on-site indoor compressed natural gas (CNG) bus fuelling system and a two-storey office administration area with extensive outdoor amenity areas.

The 32-year agreement is comprised of a

1. 2-year construction period; and
2. 30-year maintenance period

Status

Construction completed and operational as of February 2019

Partners

Public Sector

- City of Calgary

Private Sector

- Plenary Infrastructure Calgary comprising:
 - Plenary Group (Canada) Ltd.
 - PCL Investments Canada Inc.
 - PCL Construction Management Inc.
 - AECOM Canada Ltd.
 - Johnson Controls Canada LP

Other participants

Public Sector

- Colliers Project Leaders – Bridging/Compliance Team and Sub-consultants:
 - MTA – Architecture
 - MCW - Mechanical & Electrical
 - Read Jones Christoffersen Ltd. – Structural
 - Change Energy – CNG
 - McElhanney – Civil/Landscape
 - Mission Green - LEED/Commissioning
 - J.L Richards - Process
 - P1 Consulting – Facilities Management
- Torys – Legal Advisor
- Deloitte LLP – Financial Advisor
- Knowles Consultancy Services Inc. – Fairness Advisor

Private Sector

- Plenary Group (Canada) Ltd. – Developer
- PCL Investments Canada Inc. – Developer
- Plenary Group (Canada) Ltd.– Financial Advisor
- PCL Construction Management Inc. – Construction Contractor
- AECOM Canada – Prime Consultant
- Johnson Controls Canada LP – Service Provider
- Davies Ward Phillips & Vineberg (Davies), Gowling WLG – SPV Legal Advisors
- Fasken – Funders Legal Advisor
- BTY Group – Lenders Technical Advisor, Design Builder Independent Certifier

Jointly Held

- Altus Group – Project Agreement Independent Certifier

Project cost, financing and value-for-money

Total contract value (nominal dollars)

- Capital costs – \$174 million
 - \$67 million – City of Calgary
 - \$44 million P3 Canada (Government of Canada)
 - \$63 million – privately financed by Plenary Infrastructure Calgary
- Maintenance – Monthly service payments of \$509,000 in nominal dollars over the 30-year maintenance period

² Background and facts in this case study rely on the information contained in the award application submitted jointly by the project partners in September 2019 to The Canadian Council for Public-Private Partnerships. Information from the submission has been supplemented and updated with information from the procurement documents, the project agreement, other sources as noted and personal interviews with project partner representatives.

Payments covering capital costs

- A single milestone payment (substantial completion payment) was made five business days after substantial completion was achieved in the amount of \$111 million.

Private financing (nominal dollars)

- To fund Plenary Infrastructure Calgary's share of capital costs, a combination of debt, in the form of a private bond placement with an upfront draw, and equity provided the financing.
- Equity on the project was split 80/20 between Plenary Group Canada and PCL Stoney GP up until substantial completion was achieved. At that time, Plenary Group Canada purchased the 20 per cent held by PCL Stoney GP through a pre-approved transaction.

Senior debt consisted of:

- Alberta Treasury Branches ("ATB") – 35 per cent
- Toronto Dominion Bank ("TD") – 35 per cent
- Business Development Bank of Canada ("BDC") – 30 per cent

Payments during operations

- During the 30-year operational period, monthly service payments will be made of \$509,000 in nominal dollars subject to performance. The payments cover janitorial services, routine facility and landscape maintenance, and rehabilitation of the facility for the duration of the contract. City staff service and maintain the buses.

Value-for-money (present value dollars)

- The 2016 value-for-money analysis indicated using a public-private partnership (P3) model for the project would result in estimated cost savings of \$162.6 million, or 34.7 per cent, when compared to project delivery using a traditional design-bid-build (DBB) procurement method.³

Project highlights and innovative features

- At 476,000 sq. feet (44,300 m²), the Stoney CNG Bus Storage and Transit Facility (Stoney Transit Facility) is capable of holding 424 standard 12-metre (40-foot) buses

with overflow space for 50 more buses. It is the largest indoor compressed natural gas (CNG) bus facility in North America and close to the largest in the world.

- It is a LEED® Gold facility that is to be maintained at BOMA Best Level 3 standard.
- The facility's onsite, indoor CNG fuelling station made it possible for the city to integrate environmentally-friendly CNG buses into the existing Calgary Transit diesel fleet. The fuelling station includes equipment for drying, compression, storage, dispensing and de-fuelling. It is capable of fuelling 338 buses in eight hours.
- The new facility also means the city can now store its entire diesel bus fleet indoors, eliminating the need to run the engines overnight outside during hard winter days.
- The fully operational facility is expected to save taxpayers more than \$4 million per year on fuel costs when the full fleet of 400 CNG buses is reached.⁴
- The addition of CNG vehicles will also significantly reduce tailpipe emissions, greenhouse gas and noise pollution levels.
- The facility's sustainability features include rooftop rainwater harvesting to help preserve nearby wetlands, high-efficiency lighting and an innovative top-down ventilation system.

Project websites

www.calgary.ca/stoneybusgarage

³ Deloitte. *City of Calgary Stoney CNG Bus Storage and Transit Facility Project Value for Money Report October 5, 2016*, page 7. www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-cng-vfm-report-oct-5-2016.pdf. (Accessed May 15, 2020).

⁴ City of Calgary news release. *New Calgary Transit Facility largest in North America –focused on environmentally beneficial Natural Gas buses*, March 12, 2019. <https://www.calgary.ca/Transportation/TI/Documents/Transit-projects/City-of-Calgary-Media-Line-STF-Opening-March-12-2019.pdf> (Accessed May 15, 2020).



Overview

In the spirit of preparing — and meeting — its future goals as one of the world's most livable cities, Calgary has embarked on an ambitious plan to prepare its transit system for its next 30 years of service.

In 2011, the city decided to take advantage of new cutting-edge technology using compressed natural gas (CNG) to power transit fleets as part of its efforts to reduce its greenhouse gas emissions and find long-term operational cost savings.

At the time, the city was working to implement a series of long-term planning initiatives addressing its anticipated growth rate, the changing needs of its citizens and the best ways to use limited resources for decades to come. One of those plans, *A Route Ahead: A Strategic Plan for Transit in Calgary*,⁵ set out the city's vision for how improved operations and strategic investments in transit could make it the preferred mobility choice for residents.

Calgary is home to 1.3 million residents spread out over 825.3 sq. kilometres, making it one of Western Canada's most important cities and the economic heart of Alberta. Its population is expected to double by 2040. As a result, the city has projected it will also need to double its number of buses to more than 2,000.⁶

Transit use has also been on the rise in the city, located in the eastern foothills of Canada's Rocky Mountains, where the Bow and Elbow rivers meet. In 2012, Calgary Transit handled an estimated 102 million passenger trips.⁷ Seven years later, ridership had grown to an estimated 106.5 million trips, comprising buses and light rail transit.⁸

Already short on bus storage spaces, according to a study initiated in 2011, and needing to build facilities specially designed for fuelling and storing the planned new CNG fleet, the city decided to build a state-of-the-art transit operations and maintenance facility. A suitable location was found in an industrial area in northeast Calgary.

With the potential of receiving grant money from the Government of Canada by using the public-private partnership (P3) model, city staff worked with a number of advisors to perform a comprehensive delivery model assessment for the project. This process included a screening assessment, strategic assessment and value-for-money assessment.

The design-build-finance-maintenance (DBFM) model, the preferred approach for the project, was appealing because it offered independently evaluated value-for-money savings, significant risk transfers from the city to the private sector, certainty on the project's delivery timeframe, budget and returned asset condition, as well as certainty to Calgary Transit for the composition and timing of future bus fleet orders.

In March 2013, city council approved the delivery of the Stoney CNG Bus Storage and Transit Facility using the DBFM P3 model, dependent upon the project receiving funding from the Government of Canada through PPP Canada.

The city's application was successful in July 2014, with the federal government agreeing to provide up to \$48.4 million towards construction. It marked the first time PPP Canada had provided funding for a P3 project in Calgary and the city's first experience embarking on a long-term P3 agreement. Previously, the city had used a different version of the model (design-build-

⁵ Calgary Transit. *A Route Ahead: A Strategic Plan for Transit in Calgary*, 2013. www.calgarytransit.com/sites/default/files/content/PDF/2013-0118strategyaheadweb1.pdf (Accessed May 15, 2020).

⁶ City of Calgary, *Transportation Report to Priorities and Finance Committee 2013 March 12*, page 3. www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-CNG-report.pdf (Accessed May 15, 2020).

⁷ Calgary Transit. *A Route Ahead: A Strategic Plan for Transit in Calgary*, 2013 <https://www.calgarytransit.com/sites/default/files/content/PDF/2013-0118strategyaheadweb1.pdf> page 4. (Accessed May 15, 2020).

⁸ Calgary Transit. *Statistics for 2019*. www.calgarytransit.com/about-us/facts-and-figures/statistics (Accessed May 15, 2020).

finance — and 10-year maintenance and operations) to deliver its award-winning Calgary Composting Facility.⁹

After a two-year procurement process, the city selected Plenary Infrastructure Calgary to deliver the project through a 32-year DBFM agreement. The project included a 476,000 sq. feet (44,300 m²) facility that could handle storage, maintenance, fuelling and administrative functions, as well as on-site and off-site utility works to fully service the project site and surrounding road network, and the maintenance of the site for 30 years.

A 2016 value-for-money analysis conducted by Deloitte for the City of Calgary, following the project's financial close, indicated using the P3 model resulted in estimated cost savings of \$162.6 million, or 34.7 per cent, when compared with a traditional design-bid-build (DBB) procurement method.¹⁰

The project also provided an estimated 500 construction jobs, with a number of Alberta subcontractors involved in successfully delivering the project.

The facility officially opened on March 12, 2019, on time and on budget, after an extremely aggressive construction schedule of just 29 months. It reached final completion less than three months after substantial completion.

As Calgary Mayor Naheed Nenshi said in a news release celebrating its opening: "Investments in transit are among the best investments any city can make — they are investments in the environment, reducing congestion and improving mobility."¹¹

In spring 2020, more than 300 staff was estimated to work at the site, which was operating at half capacity because of the economic downturn in Calgary caused by global oil prices and

the COVID-19 pandemic.¹² When fully operational, an estimated 800 staff will work at the site.¹³

The project won silver for infrastructure in the 2019 National Awards for Innovation and Excellence in Public-Private Partnerships, presented by The Canadian Council for Public-Private Partnerships.

The project received the recognition for several reasons. As the awards committee noted: "This showpiece facility is North America's largest indoor Compressed Natural Gas (CNG) bus fuelling complex and one of the largest in the world. In addition, it is also an impressive example of infrastructure built and designed to incorporate sustainability."¹⁴

The project is also notable for its remarkably low amount of construction changes — less than 0.7 per cent. All construction issues were resolved by the project team (City of Calgary, Plenary Infrastructure Calgary and parties) without executive support, making it a model for partnership in the construction of complex and challenging projects.

This case study will highlight the factors that made the project an innovative and successful P3 and will share the experiences and lessons learned to benefit future P3 bus storage and transit facility projects.

Background and rationale

In 2005, the City of Calgary embarked on a long-term planning process to shape and prepare for the needs of the city over the next 30 to 60 years.

The result was the adoption by city council of *Calgary's Municipal Development Plan* (MDP) in 2009, which lays out the vision for how the city can provide services in a financially sustainable manner, while protecting the environment and supporting a prosperous economy.

⁹ See CCPPP 2017 National Awards Case Study on the *Calgary Composting Facility: State-of-the-Art Composting for Calgary's Organics*, May 2018. pppcouncil.ca/web/Knowledge_Centre/Publications/National_Award_Case_Studies/web/P3_Knowledge_Centre/Publications/National_Award_Case_Studies.aspx?hkey=0b95102b-b6f7-4f45-9c18-87265cc23407 (Accessed May 15, 2020).

¹⁰ Deloitte. *City of Calgary Stoney CNG Bus Storage and Transit Facility Project Value for Money Report October 5, 2016*, page 7. www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-cng-vfm-report-oct-5-2016.pdf. (Accessed May 15, 2020).

¹¹ City of Calgary news release. *New Calgary Transit Facility largest in North America –focused on environmentally beneficial Natural Gas buses*, March 12, 2019. <https://www.calgary.ca/Transportation/TI/Documents/Transit-projects/City-of-Calgary-Media-Line-STF-Opening-March-12-2019.pdf> (Accessed May 15, 2020).

¹² Interview with Danny Panday, Commercial Manager, The City of Calgary – Green Line, on May 29, 2020.

¹³ Panday, Danny. *Letter to CCPPP National Awards Committee*, September 10, 2019.

¹⁴ CCPPP News Release. *City of Calgary's Stoney CNG Bus Storage and Transit Facility Wins Silver in CCPPP's 2019 National Awards for Innovation and Excellence in P3s*, November 4, 2019. pppcouncil.ca/web/News_Media/2019/City_of_Calgary_s_Stoney_CNG_Bus_Storage_and_Transit_Facility_Wins_Silver.aspx (Accessed May 15, 2020).

The plan works together with the *Calgary Transportation Plan* to guide all urban planning decisions in the city. *A Route Ahead: A Strategic Plan for Transit in Calgary* built on this foundation.

As the urban planning guides had noted, Calgary was expected to double its population by 2040, which would only lead to greater demands on the transit system. To meet this future need, the size of the transit fleet was also expected to double in size to an estimated 2,000 buses.

There was also a desire to modernize the fleet by introducing new CNG bus technology, which would help the city achieve its ambitious greenhouse gas emission targets and save on fuel costs.

However, the larger — and greener — transit fleet required new infrastructure to house, fuel and maintain it to ensure its longevity.

As part of its due diligence, prior to the initiation of the Stoney CNG Bus Storage and Transit Facility project, Calgary Transit and city transportation staff examined the possibility of renovating the Spring Gardens Garage to enable CNG fuelling capabilities. They determined this was not a cost-effective solution and recommended a standalone, purpose-built facility that could handle both diesel and CNG bus fuelling.

The city also recognized it was already short on bus storage capacity — an important consideration in Calgary where winter temperatures can drop into the -30s C. Close to 20 per cent of its bus fleet was regularly parked outside due to a lack of garage space.¹⁵ Cold-starting engines increases wear and tear, uses more fuel and makes for an unpleasant — and cold — ride for transit users. An increase in the fleet would exacerbate this storage issue.

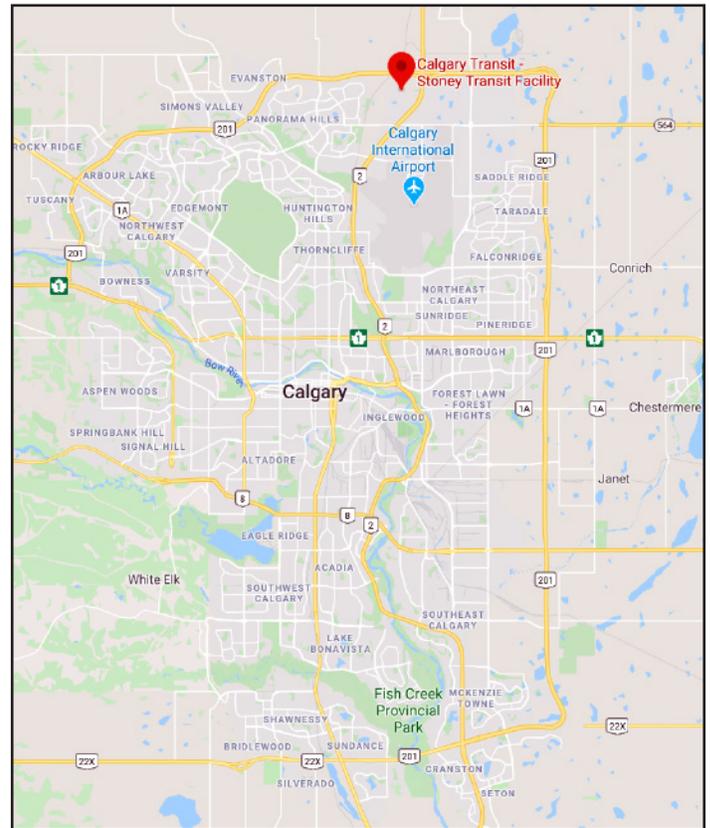
By moving ahead with the Stoney CNG Bus Storage and Transit Facility P3 project, the City of Calgary was able to meet several key objectives:

1. The Greening of the Calgary Transit fleet

The construction of an indoor CNG fuelling station enabled the integration of CNG buses into the existing Calgary Transit fleet. The overall strategy to use CNG

¹⁵ In a City of Calgary Transportation Report to its Priorities and Finance Committee on March 12, 2013, staff noted there was an existing shortfall of approximately 185 units of indoor transit bus storage capacity. The size of the city bus fleet at the time was approximately 1,000 buses. See page 3 www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-CNG-report.pdf. (Accessed May 15, 2020).

Figure 1: Location map of facility



buses over diesel represents the city's long-term commitment to using local resources (natural gas) and a more efficient use of non-renewable resources. Additionally, the city noted this switch would help reduce its tailpipe and greenhouse gas emissions and noise pollution since CNG is a cleaner burning fuel and the vehicles run quieter.

2. Cost Savings

In addition to the estimated value-for-money savings of \$162.6 million by using the P3 model, the city also projected the fully operational facility and the use of 400 CNG buses would save its taxpayers more than \$4 million per year on fuel costs.¹⁶ Longer-term contracts can also be secured with natural gas, which means the city can reduce its exposure to the volatility in fuel prices.

¹⁶ City of Calgary news release. *New Calgary Transit Facility largest in North America –focused on environmentally beneficial Natural Gas buses*, March 12, 2019. www.calgary.ca/Transportation/TI/Documents/Transit-projects/City-of-Calgary-Media-Line-STF-Opening-March-12-2019.pdf (Accessed May 15, 2020).

CNG buses also have lower maintenance costs compared to other fossil fuel powered vehicles.

Calgary is also reducing costs by locating facilities strategically across the city, which keeps operating expenses down. The northern part of Calgary has been one of its fastest growing areas and needed a garage and dispatch centre of its own to lower Calgary Transit's per kilometre costs. This means decreasing the proportion of bus operational time spent "deadheading." This occurs when drivers spend time at the start and end of their shifts travelling to and from their route without customers aboard as a result of suburban growth. Reducing deadheading also increases bus life and reduces labour costs.

3. Building Sustainably

In its procurement documents, the city stipulated the sustainability of the facility should be a key driver for its design, construction and operations, including that it achieve Leadership in Energy and Environmental Design (LEED®) gold certification, provide a safe and healthy work environment for staff¹⁷ and be built in accordance with Calgary's *Sustainable Building Policy*.

4. Enhance Communities

As city staff noted in a 2013 report to council,¹⁸ the project should enhance communities and benefit citizens by directly supporting the delivery of the primary transit network. This will provide lower cost mobility options, improve the stability of future costs and enable residents to participate in the social life of the city. Facilitating the expansion of the transit bus fleet, will also enhance Calgary's economic competitiveness by enabling labour force mobility.

The objectives of using the P3 model were to:

- Provide value-for-money for taxpayers with innovative, high-quality and long-lasting infrastructure;
- Deliver the project on time and on budget; and
- Provide an outstanding quality of service during the 30-year maintenance period.

Description of the Project

The Stoney Transit Facility, located near the Calgary International Airport, serves as the north-central service, storage and light maintenance hub for the Calgary Transit bus fleet. The scope of the project included:

- Indoor storage space to house 424 12-metre-long (40-foot-long) diesel and CNG buses. (An additional 50 buses can be accommodated in the turn lanes of the storage garage as overflow and 20 non-revenue or service vehicles can also be stored inside the interior turning area).
- 36 maintenance bays
 - 2 steam (degreasing) bays
 - 2 tire bays
 - 2 detailed cleaning bays
- On-site compressed natural gas and diesel fuelling infrastructure
- 3 fuelling lanes capable of filling six buses simultaneously
- Staff facilities and administration offices
- Outdoor parking available on site for 576 facility users; and
- Development of on-site and off-site utility works to fully service the project site and surrounding road network. This included:
 - Tie-in of the existing domestic water, stormwater system and sewer as well as installation of a new waterline and associated connections
 - Electrical supply, as well as the installation and connection of new underground fibre optic communications to existing infrastructure
 - High pressure natural gas connection to the gas main supplied to site, and connection to the ENMAX cogeneration facility.

¹⁷ City of Calgary. *The City of Calgary – Stoney Compressed Natural Gas Bus Storage and Transit Facility – RFQ*, December 19, 2014 www.inframationnews.com/article_assets/articledir_2931/1465832/RFQ%20City%20of%20Calgary%20-%20CNG%20Bus%20Facility%20-%20FINAL%2019Dec2014%202.pdf (Accessed May 15, 2020).

¹⁸ City of Calgary, *Transportation Report to Priorities and Finance Committee 2013 March 12*, page 7. www.calgary.ca/Transportation/T1/Documents/Transit-projects/stoney-CNG-report.pdf (Accessed May 15, 2020).



Rendering of an aerial view of the facility. From left to right: the bus storage area, the two-storey office building and the maintenance garage.

- Installation of stormwater collection systems in coordination with adjacent developer and to support the sustenance of the protected wetland
- Construction of storm sewer infrastructure
- Street light installation; and the
- Design and construction of three segments of roadway and two intersections

The massive 476,000 sq. feet (44,300 m²) facility is divided into three program zones:

1. **Bus Storage:** This area includes storage, circulation space, service lanes for fuelling, drive-thru bus washers, a bypass and fare dump lane and support spaces for both the building and the service operations.
2. **Office Building:** This two-storey section is where the transit dispatch operation is situated and includes washroom and locker areas, lunch rooms, lounges, a fitness area, as well as furnished courtyards and patio area.
3. **Maintenance Garage:** This area includes hoists, inspections and oil changes, bays for degrease work and tire repair, enclosed bays for detailed cleaning, a tire

workshop, parts storage, shops for batteries and welding; compressors, loading docks, as well as library space, supervisory offices, training and meeting rooms.

Innovative Features

The Stoney Transit Facility marries cutting-edge technology and environmental design features to help pave the way for the transformation of Calgary Transit, from a system relying on diesel buses towards greener transportation using compressed natural gas (CNG).

Overall, the building design is focused on creating healthy indoor environments, reducing greenhouse gas emissions, and the efficient use of energy, water and other resources through robust and dependable systems

The project's Technical Requirements (Schedule 18) detailed many of the sustainable features the City of Calgary required for the facility, including:

- Skylights and clerestories throughout (to provide natural daylight)

- Fast open/close overhead doors and main bus entrances and exits (to assist in heating and cooling loads)
- Cogeneration waste heat utilization (feeds the boilers for heating and cooling through absorption chillers); and
- Wetland protection and build out of stormwater retention ponds for both the site and neighboring areas.

Plenary Infrastructure Calgary, as part of the Leadership in Energy and Environmental Design (LEED®) certification process and through development of its design, also introduced:

- High velocity directional supply air nozzles in the storage garage (reducing energy costs and making for clear sight lines through the storage garage)
- Occupancy and daylight sensors throughout the facility
- Increased solar energy (photovoltaic) system
- Separated fluids rooms (to reduce fluids pump sizing); and
- Electric CNG compressors.

A significant unknown for the consortium was the fact the project was one of the first to go through the LEED® v4 certification process, which meant there was little documentation available on how the organization would interpret and calculate credits. And, under its agreement with the city, Plenary Infrastructure Calgary had to achieve that standard for the facility within 18 months of substantial completion or suffer a \$1-million penalty. As a result, the consortium built a buffer into its energy efficiency features for the project.

In 2019, the facility achieved its gold certification from LEED® for its sustainable and resilient design enabling future flexibility. This was achieved five months after substantial completion. It also must be maintained by Plenary Infrastructure Calgary at a BOMA Best Level 3 standard¹⁹ for the life of its 30-year P3 agreement the city.

¹⁹ BOMA BEST is Canada's largest environmental assessment and certification program for existing buildings. It is a voluntary program designed by industry for industry; it provides owners and managers with a consistent framework for assessing the environmental performance and management of existing buildings of all sizes. There are currently more than 7,000 buildings that have obtained certification or recertification since the program started in 2005.

Design innovations

Top-down ventilation design to eliminate air contamination

One of the challenges with indoor bus storage and fuelling facility is providing adequate ventilation that directs air towards the exhaust system in an energy efficient manner while ensuring sufficient air dispersion to avoid the potential for an explosion in the event of a gas leak.

The traditional design approach in a garage is to use low-level air ducts along building columns to push the exhaust air upwards, however this presents multiple challenges:

- The air ducts obstruct the view of drivers;
- The air ducts increase the static pressure and drive up energy costs;
- The air ducts do not provide sufficient coverage when there is varying configuration of bus sizes within the space; and,
- The air ducts require cleaning and are subject to damage.

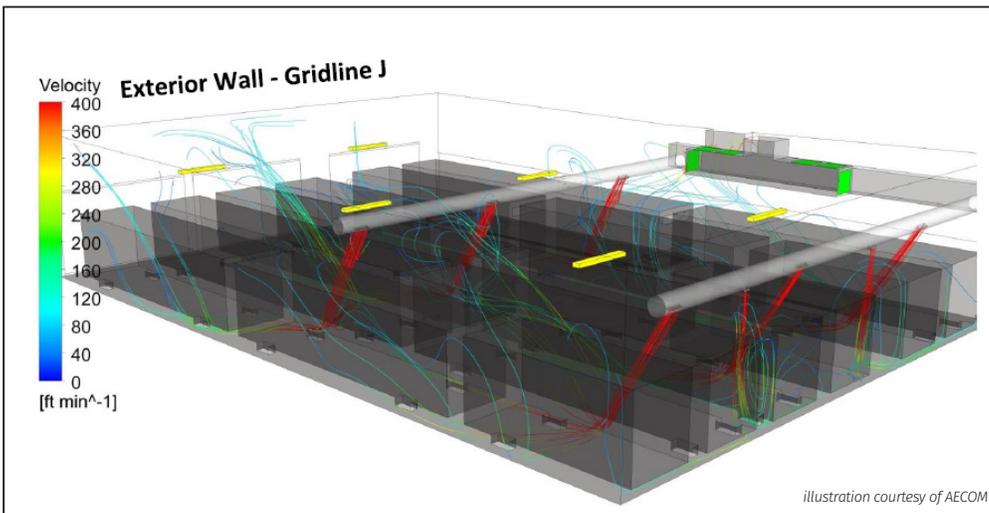
In a deviation from what was envisaged in the contract, the consortium — with the support of the city — decided to try a more innovative approach using top-down ventilation, which improved distribution of supply air and allowed for more efficient removal of contaminants from the space.

For six months, the AECOM design team conducted in-house computational fluid dynamic modelling to rigorously test the proposed top-down ventilation system using different bus configurations. This is a first in these types of structures and may set a new standard.

The team studied how best to direct the air flow from the overhead air handling units to ensure contaminants — both natural gas, which is lighter than air, and diesel fumes, which are heavier — were picked up by washing the low-level floor areas with high velocity air. That air is then pushed back up towards the exhaust fans. In addition, the exhaust fans are explosion proof.

See Figure 2 on page 12 for a diagram of the air supply system.

The testing was deemed a success and the city gave its approval for the design change, which eliminated the need for air ducts throughout the storage garage, lowered the energy usage of the space and is ultimately providing a safer and more aesthetically pleasing space for workers.

Figure 2: Top-down ventilation

The consortium pushed for a more innovative approach because it carries the energy management risk for the project for the next 30 years. Although it proved to be a more expensive approach in the design phase, the adoption of the top-down ventilation system helped cut down on construction costs and is leading to decreased energy usage — and costs — over the long term for the facility.

Environmental features

Harvesting rainwater to preserve wetlands

The facility is part of a 30.4-hectare (75 acre) parcel of previously undeveloped land — with 25 per cent of the site set aside as a protected environmental reserve.

Wetlands preservation is a key concern in Calgary since the city is one of the driest in Canada, with an average annual rainfall of just 321 mm (12.6 inches).²⁰ To help replenish and preserve the nearby marsh and its dependent wildlife, the facility features a system of pipes to direct much-needed rainwater collected on the flat roof of the maintenance garage towards the marsh.²¹

Initially, the project agreement had called for the installation of an underground storage tank for the rainwater and its use

²⁰ Life in Calgary. www.lifeincalgary.ca/moving/calgary-facts#weather (Accessed June 1, 2020).

²¹ In June 2020, the site was awaiting a government policy/code update before installing the final outlet to distribute the water in the wetland. The rainwater is now temporarily collected in an on-site storm pond before release into the city sewer system.

in the facility's bus wash system, washrooms and irrigation. But a greater understanding of how the facility would operate, as well as a change in government policy on how these tanks could be used, rendered the value of such a system moot, leading Calgary to issue a change order providing a credit to the city.

In addition, the facility is capturing, treating and recycling a minimum of 80 per cent of the pipe water used during the bus washing process²² and saving on outdoor water usage by landscaping with non-irrigated, native plants.

Cogeneration facility

An 800kW cogeneration facility supplements the facility's energy needs and is expected to be operational for 85 per cent of the time per year. The cogeneration facility is designed, owned and operated by utility provider ENMAX and is outside the scope of the project.

However, the consortium coordinated its design to accommodate the facility and assisted in energy modelling exercises to determine the optimum size for the unit and was responsible for factoring the cogeneration facility into the infrastructure design. This included the design of the heat exchange that feeds the facility boilers to utilize waste heat and the electrical design including the transformers. This work was part of the base scope of the project for Project Co to respond to.

Energy efficiency

In addition to the previously mentioned energy efficient features, the design of the facility also includes:

- Roof and wall assemblies with high overall thermal performance;
- High performance windows with a low-e argon glass;
- Air handling units with plate heat exchangers to reclaim energy;

²² Interview with Danny Panday, Commercial Manager, The City of Calgary – Green Line, on May 29, 2020.



The facility is harvesting its rainwater to help preserve a nearby wetland.

- Heat wheel application to reclaim heat from office areas with high exhaust requirements;
- High efficiency condensing boilers;
- Variable speed drives on supply and return fans on each air handling unit;
- Variable speed drive on heating and cooling loop pumps;
- Variable speed drive on cooling tower with variable-frequency drive (VFD) fans;
- Supervised control of air handling units serving areas with bus traffic in order to ensure code compliance while optimizing energy consumption; and
- Rigorous selection criteria around bus door materials and fit in order to minimize energy consumption and ensure long life.

The facility also achieved even greater energy reduction by working with the gas line infrastructure owner (ATCO) to deliver 550 psig of inlet gas pressure to the site. This provided a reduction in the brake horsepower required for the four CNG compressors resulting in a capital credit for the city and ongoing reduction in energy costs, estimated at \$1,000 per CNG bus per year.

Modified design to shrink footprint

During the project pursuit, Plenary Infrastructure Calgary suggested changes to the concept design to cut down on the size of the facility, thereby reducing energy and capital material costs.

These significant modifications, which the city was open to exploring and ultimately accepted, included removing bus circulation lanes and adding more doors inside the maintenance garage, as well as changing the configuration for bus parking in

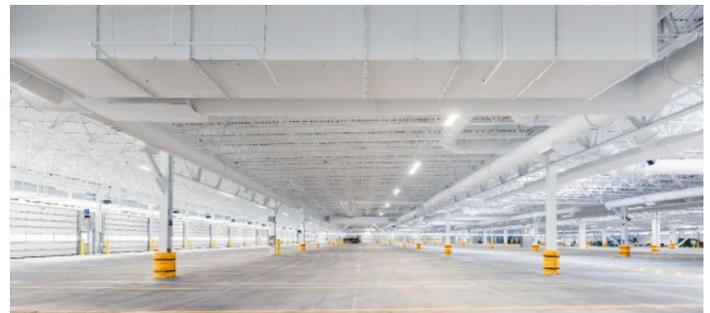
the storage area. This cut down on the square footage required for the circulation lanes (by making them longer) while also increasing the flexibility in the parking spots for the 12 metre (40 foot) and 18.3-metre (60 foot) buses. Overall, the changes shaved approximately 7,432 sq. metres (80,000 sq. feet) from the facility.²³

Equipment selected with long-term maintenance in mind

Long-term maintenance is an important consideration in a P3 agreement with a maintenance component. In addition to some of the standard considerations (flooring selection, extended roof warranty), this facility has unique items such as:

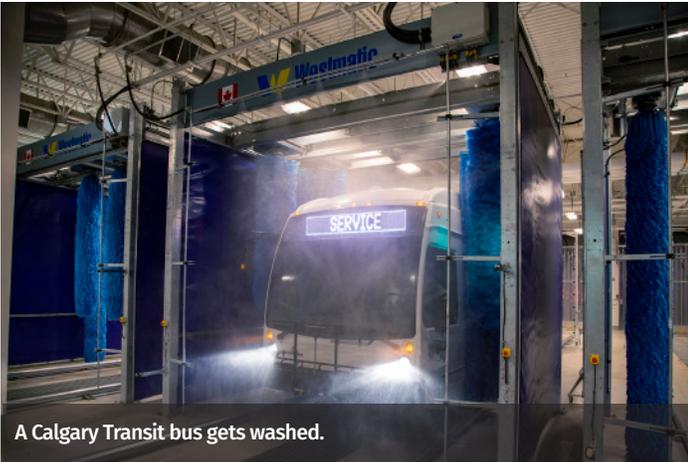
Piston driven bus lifts

The initial design for sunken pit bays for conducting bus maintenance was overhauled during the project pursuit given concerns over occupational health and safety issues. As a result, the teams were asked to consider using hydraulic piston lifts or scissor lifts to raise the buses off the floor to conduct maintenance.



The Bus Storage area uses an innovative top-down ventilation system.

²³ Interview with Court Horne, Vice President, Delivery, Plenary Americas, on June 2, 2020.



A Calgary Transit bus gets washed.

The Plenary Infrastructure Calgary team decided to move forward with the piston option in its RFP submission because long-term maintenance is more economical over time, although there is a greater upfront capital cost. In comparison, if the pins in the accordion-like scissor lifts are not properly cleaned they can jam and break, requiring replacement.

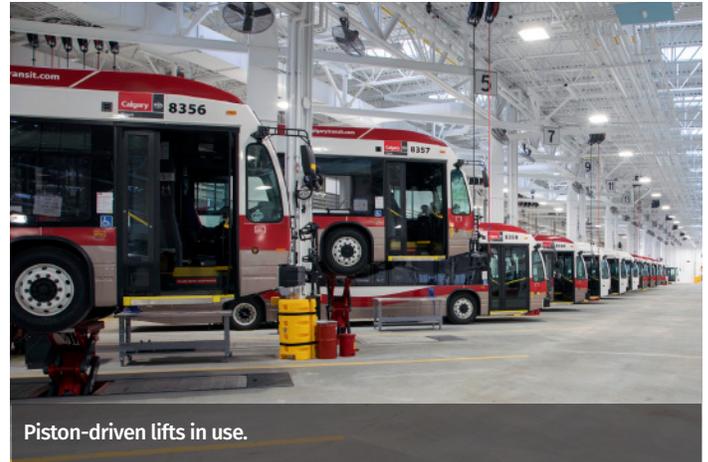
Electric CNG compressors

Originally when the RFP was released, it required the use of gas CNG compressors, which are cheaper to purchase and cheaper on energy costs. This was because the City of Calgary was getting 25 psig gas pressure and the life cycle cost benefit analysis concluded that gas drive compressors had the best NPV. During the RFP, the city and ATCO Gas signed an agreement that would provide Calgary with 100 psig, with the option to continue to explore higher inlet gas pressure. The city's assessment of 100 psig inlet gas pressure indicated that electric and natural gas drive compressors had similar life cycle costs, and depending on the proponents' costs, either solution could be cheaper. To ensure full costing and fairness in bids, the city required proponents to include in their price submissions the energy cost for operating the CNG compressors using the city's cost of natural gas and electricity.

Other notable features

The CNG Fuelling Station

The station, which is Calgary Transit's first on-site indoor CNG bus fuelling system, is run remotely by computer and includes equipment for drying, compression, storage, dispensing and defuelling. It is capable of fuelling a single standard 10,000 standard



Piston-driven lifts in use.

cubic feet per minute (scfm) bus in less than four minutes or 338 buses in eight hours, which works out to 2.7 million standard cubic feet of fuel.

Employee Amenities

Natural light welcomes employees as they enter the facility's interior spaces. There are also outdoor seating areas for lunches and coffee breaks, pathways providing access to the protected natural wetland space and support for staff and visitors to arrive by bicycle or green or electric vehicles.

Procurement Process

The City of Calgary selected the Design-Build-Finance-Maintain (DBFM) model after performing a comprehensive delivery model assessment between 2012 and 2013. This work, which included screening, strategic and value-for-money assessments, was submitted as part of the city's business to PPP Canada on March 28, 2013.

After receiving news its submission had landed the city a grant of up to \$48.4 million from the PPP Canada Fund, the city decided to move ahead with delivery of the project as a DBFM.



An outdoor seating area is just one of the employee amenities at the facility.

Selecting the P3 model

In a report to Calgary city council in 2013,²⁴ city staff noted the strategic benefits of using the DBFM P3 model, included:

- Achieving significant risk transfers from the city to the private sector;
- Delivering certainty on the project's delivery timeframe, budget and returned asset condition after 30 years;
- Delivering certainty to Calgary Transit with respect to the composition and timing of future bus fleet orders; and
- Enabling the city to proceed with construction of a new, high-priority CNG-equipped facility within 24 months.

Cost savings/value-for-money

In addition, P3 projects undergo a value-for-money (VFM) analysis where the P3 approach is compared with traditional procurement. Before the procurement process started, the City of Calgary hired Deloitte in October 2012²⁵ to independently assess whether VFM would be achieved by delivering the Stoney CNG Bus Storage and Transit Facility project using the DBFM method.

²⁴ City of Calgary, *Transportation Report to Priorities and Finance Committee 2013 March 12, page 4*. www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-CNG-report.pdf (Accessed May 15, 2020).

²⁵ Ibid.

In the preliminary VFM, calculated before the execution of the procurement process and contract award, it was estimated using the DBFM model would lead to five per cent VFM over the design-bid-build approach.

In 2016, the city asked Deloitte to update its VFM estimate after the project reached financial close. The final VFM indicated a significant jump in the estimated cost savings to \$162.6 million or 34.7 per cent.²⁶

Selecting a partner

Competitive process

The procurement process for the project had two stages: Request for Qualifications (RFQ) and Request for Proposals (RFP). The City of Calgary followed a process in accordance with its Evaluating and Procuring Public Partnerships Policy (FA-052). It took 24 months to complete the process from RFQ to financial close.

Request for Qualifications

On December 19, 2014, the city issued a Request for Qualifications. The submissions were reviewed to pre-qualify

²⁶ Deloitte. *City of Calgary Stoney CNG Bus Storage and Transit Facility Project Value for Money Report October 5, 2016, page 7*. www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-cng-vm-report-oct-5-2016.pdf. (Accessed May 15, 2020).

Figure 3: Final Value-for-Money Estimate

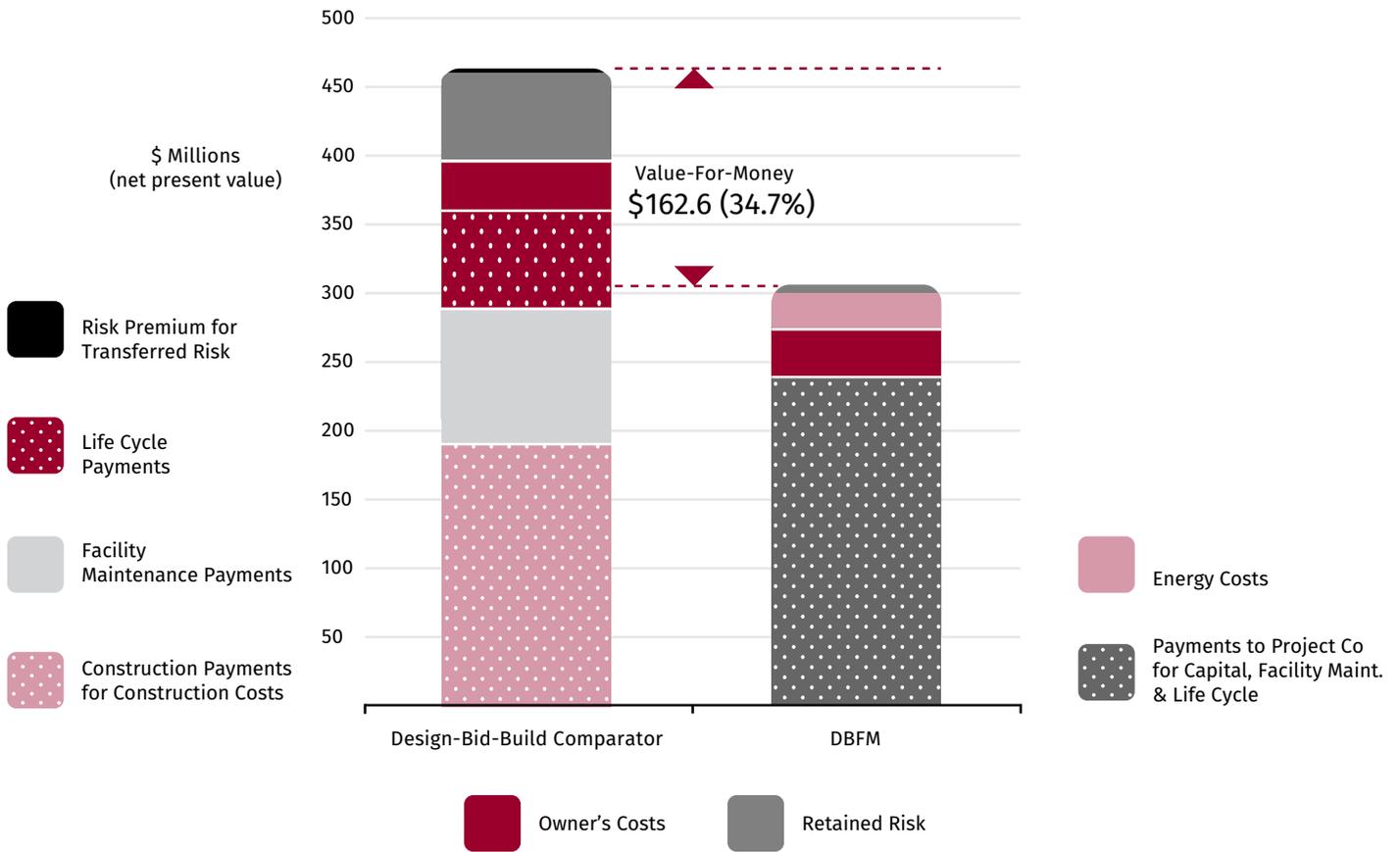


Table 1: Value-for-money results

DBB Model \$ Millions (NPV)		DBFM (Project Co) \$ Millions (NPV)	
Total Project Base Cost	\$395,641	Total Project Base Cost	\$299,518
Retained Risk	71,566	Retained Risk	5,805
Transferred Risk	695	Transferred Risk	Included in base cost
Total Risk-Adjusted Project Cost	467,902	Total Risk-Adjusted Project Cost	305,323
		Project VFM \$	162,579
		Project VFM %	34.7%

project teams with the design, construction and facilities management experience as well as the qualified personnel and the financial capacity and experience, to deliver a project of this size and complexity.

On February 26, 2015, the RFQ period closed and the city received statements of qualifications from four teams. The city announced its three short-listed proponents on March 31, 2015. The three shortlisted teams are shown in Table 2.

Request for Proposals

Five months later, the city issued its Request for Proposals to the three prequalified teams, outlining the bid process and project expectations.

The RFP, which closed almost a year later, dictated a two-part submission: Part A (Technical) and B (Financial). The Technical Submission was due on June 9, 2016. The Financial Submission was due on July 6, 2016, closing the RFP period.

An Evaluation Committee, created by the city, reviewed the proposals in accordance with the RFP documents. It ranked the submissions in a seven-step process.

The three proposals were evaluated on the following requirements:

- Mandatory Requirements – Technical: Confirmation each submission complied.
- Review of the Proposal Submission Form (Technical): Review of prequalified parties, conflict of interest and confidential information.
- Review and Scoring of the Technical Submission: Each proposal was evaluated and scored on a pass or fail basis.
- Mandatory Requirements – Financial: Confirmation each technical submission complied.

- Review of the Proposal Submission Form (Financial): Review of prequalified parties, conflict of interest and confidential information.
- Review and Scoring of the Financial Submission: Assess for the lowest net present value (NPV) price. Only those Proponents that received a ‘pass’ on their Technical Submission were considered for financial evaluation.
- Ranking the Proponents – Proponents were ranked on the NPV of their proposal prices.

Name of private partner

Based on the score and ranking, Plenary Infrastructure Calgary (PIF) was notified on July 19, 2016 that it was the preferred proponent for the project based on the RFP’s predetermined evaluation criteria, including construction schedule, technical requirements, price, operational and management plans and financial backing.

PIF was the proponent with the lowest cost financial offer on a net present value. Its NPV was \$262,488,150 (of this \$22,046,623 represent the value for energy costs per the submitted energy model. The city is responsible for paying these costs directly).

Commercial and Financial Close

The commercial and financial close project agreement between Plenary Infrastructure Calgary and the City of Calgary was executed and announced on September 13, 2016. Table 3 outlines the overall timeline for the project.

Table 2: Qualified teams

Plenary Infrastructure Calgary	EllisDon Infrastructure	Stoney Transit Partners
<ul style="list-style-type: none"> ▪ Plenary Group (Canada) Ltd. ▪ PCL Construction Management Ltd. ▪ AECOM Canada Ltd. ▪ Johnson Controls Inc. 	<ul style="list-style-type: none"> ▪ EllisDon Capital ▪ EllisDon Construction ▪ GEC / Strasman Architects / Morrison Hershfield ▪ Cofely Services 	<ul style="list-style-type: none"> ▪ Gracorp Capital / CIF Infra 3 ▪ Graham Design Builders ▪ Kasian Architecture Interior Design and Planning ▪ Black & McDonald

Table 3: Project timeline

<p>2012-2013</p> <p>The City of Calgary selects the DBFM model after performing a comprehensive delivery model assessment. This includes a screening assessment, strategic assessment and VFM assessment.</p>	<p>2016 July 19</p> <p>City announces preferred proponent</p>
<p>2013 March 28</p> <p>City of Calgary submits its business case to PPP Canada to access funding</p>	<p>2016 September 13</p> <p>Commercial and financial close</p>
<p>2014 July 30</p> <p>Government of Canada and City of Calgary announce P3 Canada Fund investment to support facility's construction</p>	<p>2016 October 4</p> <p>City holds groundbreaking event</p>
<p>2014 December 19</p> <p>RFQ issued</p>	<p>2017 April</p> <p>Construction begins</p>
<p>2015 February 26</p> <p>RFQ submissions due</p>	<p>2019 January 31</p> <p>Substantial completion of building; preparing for occupancy</p>
<p>2015 March 31</p> <p>Three qualified teams shortlisted</p>	<p>2019 March 12</p> <p>Facility officially opens</p>
<p>2015 August 31</p> <p>RFP issued</p>	<p>2019 March 18</p> <p>Employees officially start working in the facility</p>
<p>2016 June 9</p> <p>Part A (Technical) submission due</p>	<p>2019 May</p> <p>Achieves Leadership in Energy and Environmental Design (LEED®) v4 Gold Certification</p>
<p>2016 July 6</p> <p>Part B (Financial) submission due. Full RFP process closes</p>	<p>2049</p> <p>End of 30-year maintenance term</p>

Fairness of the process

To ensure the procurement process was rigorous, fair, open and transparent, Knowles Consultancy Services Inc. was hired by the city as the independent fairness advisor to review and monitor the tendering process.



Officials take part in the official groundbreaking for the Stoney Transit Facility

The fairness monitor was invited to attend all commercially confidential meetings to oversee the process and ensure evaluation procedures and assessment tools were properly used and that confidentiality and conflict of interest rules were strictly adhered to.

During the RFQ, the fairness monitor attested that “in our opinion, the procurement process administered by the city satisfied or exceeded procedures related to fairness, openness and transparency.”²⁷

And the RFP was also “conducted in accordance with the provisions of the RFP and subsequent documents issued during the process which met the established principles of fairness, openness and transparency.”²⁸

Overall Structure of the Project Agreement

The private sector team consists of four parts: developer/ sponsor, builder, architect and services.

Equity Providers

Plenary Infrastructure is a co-equity provider on the project, handling long-term financing, while PCL Investments handled short-term financing for the design and construction period.

²⁷ Deloitte. *City of Calgary Stoney CNG Bus Storage and Transit Facility Project Value for Money Report October 5, 2016*, page 6. <https://www.calgary.ca/Transportation/TI/Documents/Transit-projects/stoney-cng-vfm-report-oct-5-2016.pdf>. (Accessed May 15, 2020).

²⁸ Ibid.

Construction

PCL Construction Management Inc. took primary responsibility for the design-build requirements and used a number of Alberta subcontractors, including Strathcona Mechanical, Crestview Electrical, Glenmore Fabricators, Phoenix Petroleum and Change Energy West.

Design

AECOM Canada Ltd. was responsible for the design of the new bus storage and transit facility through a design services agreement to PCL.

Facility management services

Johnson Controls Canada LP is providing specified facility management and life cycle services during the 30-year operating period.

The consortium is responsible for

- Plant services;
- Help desk services;
- Utility management services;
- Roads, grounds and landscape maintenance services;
- Environmental and sustainability services;
- Life cycle maintenance (major capital renewals and repairs); and
- Maintaining the facility over the 30 years of the operations contract phase and returning it in a pre-specified handback condition at the end of the term

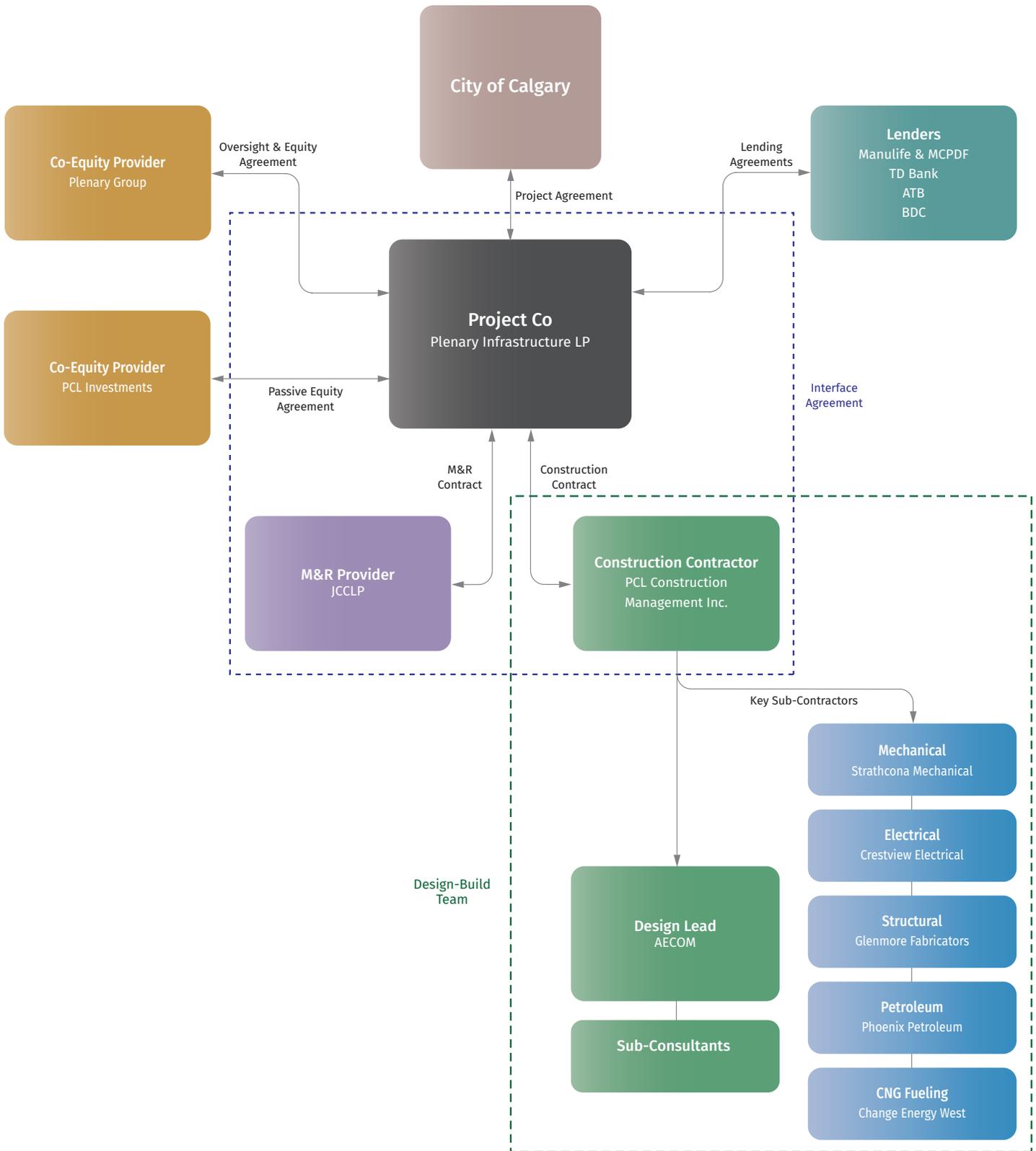
It is important to note that city staff continue to operate, service and maintain the buses.

Responsibilities and Risk Allocation

Under the project agreement, examples of risks transferred to Plenary Infrastructure Calgary in this project include (but are not limited to the following):

- Construction price certainty: The consortium financed and constructed the new bus storage and transit facility to the specifications predetermined by the City of Calgary.
- Scheduling, project completion and delays: The team was required to reach substantial completion by January 31, 2019. In accordance with the project agreement, the

Figure 4: Partnership structure



construction schedule could only be modified in limited circumstances. Any costs associated with delays that were the responsibility of PCL Constructors Canada Inc. would have been dealt with by Plenary Infrastructure Calgary.

- Design co-ordination/completion: Under the DBFM approach, the builder is responsible for design co-ordination activities to ensure the facility is constructed in full accordance with the design in the project agreement.

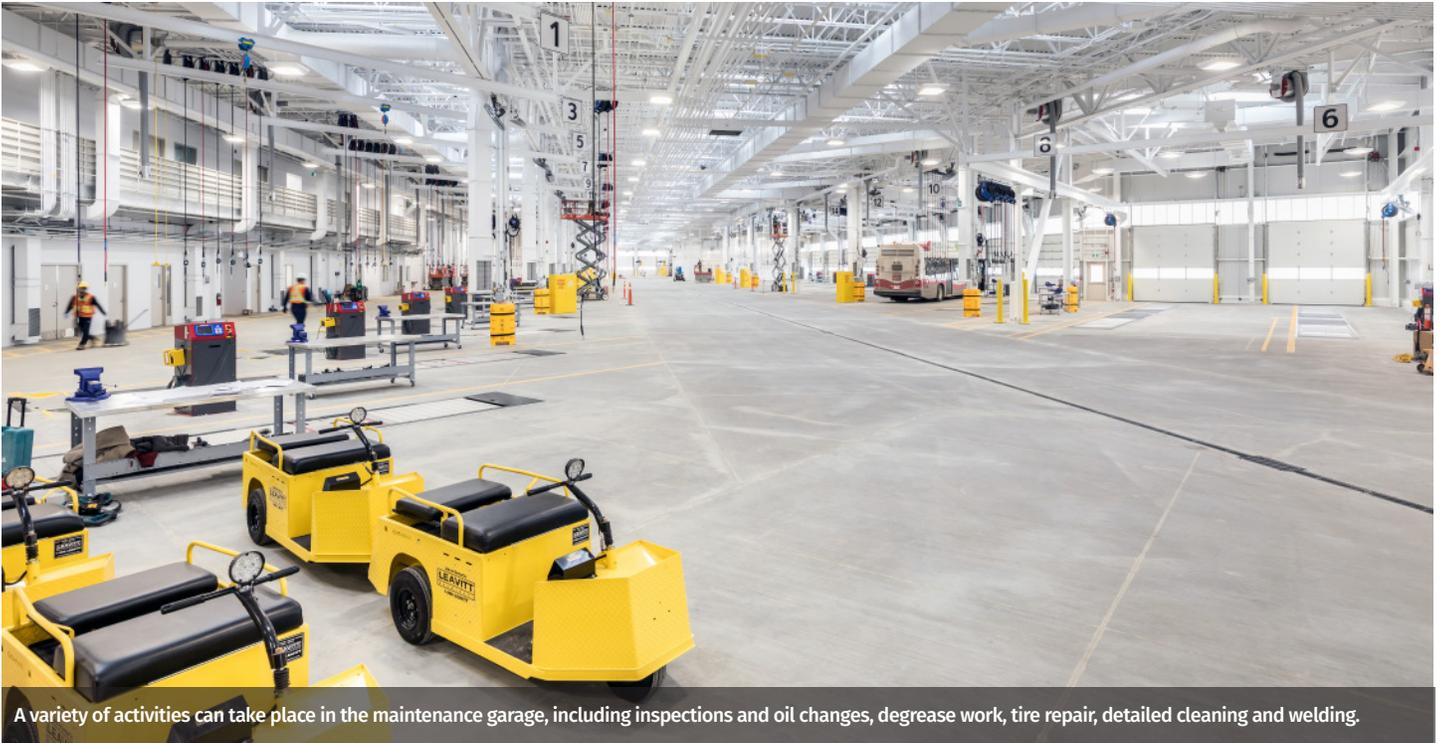
The builder is responsible for inconsistencies, conflicts, interferences or gaps in these design documents, particularly in the plan drawings and specifications; and for design completion issues that are specified in these design documents but erroneously left out.

- Development permits, licences and approvals: PCL was responsible for applying, obtaining, maintaining, renewing and complying with all necessary permitting, licensing, and development approvals through construction.

Table 4: Summary of Risk Allocation

Risk	Plenary Infrastructure Calgary	City of Calgary	Third-Party
Planning		■	
Financing	■		
Construction price certainty	■		
Design	■		
Development permits, licences and approvals	■		
Scheduling, project completion and delays	■		
Unknown site conditions		■	
Changes in law		■	
Force majeure ²⁹		■	
Construction of new infrastructure	■		
LEED® certification	■		
Ownership		■	
Public-initiated scope changes		■	
Facility maintenance	■		
Bus servicing and maintenance		■	

²⁹ This really only provides relief from City Financial LDs (which are inconsequential to Financial LDs).



A variety of activities can take place in the maintenance garage, including inspections and oil changes, degrease work, tire repair, detailed cleaning and welding.

- Building elements the consortium are responsible for include:
 - Any issues with respect to the functionality, durability, maintainability and life cycle cost of the mechanical and electrical systems specified in their design, including whether such systems will be adequate to meet the output specifications on a consistent basis for the duration of the operational term; and
 - The operation and periodic replacement of all elements of the facility, whether part of the mechanical and electrical systems or otherwise, including finishes, seals, structural components, hardware and building fabric, as required to achieve the output specifications for the duration of the operational term.

Live cycle profile & handback requirements

In 2019, Plenary Infrastructure Calgary provided — and the City of Calgary approved — a life cycle plan for the facility listing all equipment and their scheduled life cycle maintenance, including whether partial or full maintenance would be required

and when. In general, the large-scale equipment such as compressors and pumps are expected to last 10 to 15 years. Further details on the life cycle profile cannot be shared as it is proprietary to the consortium's service provider.

In preparation for handback, at year 25 of the project agreement, the consortium will conduct a major review of all asset groups to determine what the remaining expected life cycle is for each and whether any renewal work is likely to be required before the 30-year maintenance agreement expires.

Following the inspection, a work plan and schedule acceptable to the City of Calgary must be provided to ensure the facility will meet handback requirements. If the consortium fails to deliver the handback work plan and schedule in accordance with the project agreement and RFP, the city may hold back amounts owed to the consortium under the project agreement.

In general, handback requirements are minimal on the project and limited largely to select items having a five-year handback. The City of Calgary understood the value-for-money consideration with handback and chose to significantly reduce the requirement providing savings to the taxpayer.

The city wanted some flexibility in the requirements. It expects that if the consortium replaces assets on their 10-year life cycles, for example, they will expect those assets to have nine to

10 years of life remaining at the time of handover. However, the consortium will not be punished if it is able to stretch the life of an asset through good maintenance.

The city also expects the building structure to still have 20 years remaining in its life cycle at handover (all new city-owned facilities are designed to have a 50-year life cycle with a major life cycle upgrade every 25 to 30 years).³⁰

Financial Arrangements

Capital costs

The total contract value of the project is comprised of:

- \$174 million for the design-build portion; and
- Monthly service payments of \$509,000 in nominal dollars over the 30-year agreement

Capital costs were funded by the City of Calgary (\$67 million), P3 Canada (Government of Canada [\$44 million]) and \$63 million privately financed by Plenary Infrastructure and PCL Investments.

The consortium's portion of the project equity was an 80/20 split between Plenary Group Canada and PCL Stoney GP until substantial completion was achieved. At that time, Plenary purchased the remaining 20 per cent from PCL through a pre-approved transaction.

A combination of debt, in the form of a private bond placement with an upfront draw, and equity provided the financing.

Senior debt consisted of:

- Alberta Treasury Branches ("ATB") – 35 per cent
- Toronto Dominion Bank ("TD") – 35 per cent
- Business Development Bank of Canada ("BDC") – 30 per cent

The lenders were selected by way of a competitive selection process that tested all available debt products.

The project was also the latest in a series of projects secured and financed with the same core consortium partners. At the time of securing debt commitments, the lending community had become intimately familiar with the credit quality, technical experience and execution record of the core consortium team

³⁰ Interview with Danny Panday, Commercial Manager, The City of Calgary – Green Line, on May 29, 2020.

members.³¹ This familiarity was leveraged to secure efficient pricing and advantageous debt terms — most notably reduced financial security requirements and no requirement for a credit rating.

Payments

Construction period payments

A single milestone payment ("Substantial Completion Payment") of \$111 million was made by the City of Calgary to the consortium five business days after substantial completion was achieved on January 31, 2019.

This payment will be followed by monthly service payments of \$509,000 in nominal dollars over a 30-year period for construction of the facility, building maintenance, life cycle repair and renewal and project financing.

Revenue sharing

There is no revenue sharing.

Communications

Between the partners during construction

The Design and Construction Committee facilitated official conversations between the partners during the construction phase. This committee, which consisted of four representatives appointed by the city and three appointed by the consortium, met biweekly for site progress meetings from the time of commercial close to final completion.

This meeting was attended by the city representative, the compliance team technical lead, the Plenary Infrastructure Calgary LP representative, the design-builders site management

³¹ Plenary, PCL and Johnson Controls have delivered multiple projects together including the Swift Current Long-Term Care Facility in Saskatchewan, the Abbotsford Law Courts in British Columbia and many more in Ontario and Quebec. In an interview with Court Horne, Vice President, Delivery, Plenary Americas, on June 2, 2020, he said: "I think a key to our collective success together is maintaining an informal open dialogue through the pursuit, design and construction and operational phases with a focus on meeting the facility users' needs first and the contract second. This has led to many innovations that afforded savings inevitably to the taxpayer and provided added value to the facility users."

team and the design team lead. Other parties were included as required.

The biweekly meetings discussed and reviewed:

- Any development application, design, construction and commissioning issues or critical milestones;
- The construction schedule with a focus on the three-week look ahead;
- Innovations and city mandated change orders;
- Development Change Register;
- Quality assurance and safety matters;
- The monthly report; and
- Ancillary items

These meetings were highly effective. In fact, the monthly Construction Period Joint Committee established in the project agreement was not utilized as it was not required based on the level of communication and decision making authority already taking place.

Following the completion of the construction portion of the project, the partners held a Lessons Learned session in June 2019. This enabled participants to provide constructive feedback on the construction period process from communication to contract language, to scope and value-for-money.

This session was attended by the leads from the city, Plenary Infrastructure Calgary LP, and the design builder with feedback solicited from all levels.

The session was facilitated by City of Calgary staff external to the project in an effort to maintain an objective view and solicit useful, tangible feedback for future city projects and for the consortia.

Between the partners during operations

The Service Management Committee handles official communications in this phase. The three-person committee has a city representative, a representative from Plenary Infrastructure Calgary and the FM representative. The Service Management Committee interfaced with the Design and Construction Committee, during the construction phase, as required.

The Service Management Committee established working groups for the M&R period including the Facility Management Working Group and the Utility Working Group.

The Service Management Committee is responsible for receiving and reviewing all matters related to the project

operations, both prior to and during the Operational Term, including:

- The transition from the existing facilities to the new facility;
- Any joint review of the consortium services and the output specifications;
- Recommendations of the Utility Working Group;
- Any changes to Quality Plans;
- Any performance issues;
- Development and modification of performance standards for the Facility FM Services (performance standards shall be based on the Project Co Proposal Extracts and Good Industry Practice);
- Any interface issues between the consortium services and city staff;
- Any community and media relations issues; and
- Any other issues pertaining to the project operations

The Service Management Committee was established in accordance with the terms of the project agreement.

With the public

The City of Calgary took a lead role on all communications with the public related to the project leading up to and during construction. The city was responsible for:

- Maintaining and updating the project website;
- Acting as primary media contact; and
- Providing coordinated updates to internal/external stakeholders

The city also coordinated the groundbreaking event in October 2016³² and the official opening in March 2019.³³

The city retains responsibility for communications related to the facility during the 30-year maintenance phase of the P3 agreement, as well, with assistance from Plenary Infrastructure Calgary as needed.

³² City of Calgary. *Video of Stoney CNG Bus Storage and Transit Facility. Ground Breaking, October 2016* www.youtube.com/watch?v=Yh3VehEDqyc&feature=youtu.be.

³³ City of Calgary. *Video of Official Opening of Stoney CNG Bus Storage and Transit Facility, March 2019*. www.youtube.com/watch?v=3Rb6WJY4VSY&feature=youtu.be.

Dispute Resolution

The Dispute Resolution Process, which governs disputes between the consortium and facility owner, is detailed in the contract and is typical with the process used across the majority of P3s. The mechanism for dispute resolution remains in place for the entire term of the agreement, as the amicable resolution of issues is always the first step and desired outcome.

As of spring 2020, it had not been utilized for the Stoney Transit Facility. During construction, all matters were resolved at the project team level and were of little consequence.

Performance Monitoring

During construction

The project agreement stipulated that both the City of Calgary and Plenary Infrastructure Calgary had to appoint design and construction representatives. The city representative was responsible for reviewing, approving, accepting or confirming the consortium's activities in accordance with the project agreement. The city representative was supported by a compliance team of professionals who had full access to the construction site, drawings and specifications and regularly reported their observations to the city.

- In addition to the transfer of key risks to Plenary Infrastructure Calgary under the project documents, the financing arrangement entered into between the project company and its lenders ensured the project was subject to additional oversight, including an independent invoicing review by a third-party cost consultant;
- Monthly reporting and project monitoring by a third-party cost consultant; and
- ISO Certified Quality Management system including reporting, and third-party auditing

During operations

The project agreement stipulates both the city and Plenary Infrastructure Calgary must appoint a representative to serve as a member of the Service Management Committee ("SMC") over the 30-year operating term of the agreement.

The SMC is a formal forum for the parties to consult and co-operate on all matters related to the facility during the operational term.

During the operations phase, Plenary Infrastructure Calgary will provide the city with the following plans for review and approval:

- Annual and five-year plans for facilities maintenance and life cycle; and
- Management of building needs to conform to plans and performance indicators outlined in the project agreement

Quality management

The project agreement is designed to motivate Plenary Infrastructure Calgary to ensure delivery, performance and high standards of quality given the monetary consequences of not achieving these requirements.

Monthly reports delivered to the city are expected to contain a variety of information, including:

- Summary of calls made to the facilities management help desk and their resolution;
- Summary of unavailability events and service;
- Calculation of the monthly service payment owed to Plenary Infrastructure Calgary; and
- A summary of all life safety actions and statutory testing (e.g. fire extinguisher inspections)

These reports allow for a thorough review and analysis by the city to ensure the facility is performing as intended. It will also ensure building operations and conditions are consistent and achieving project objectives. There are strict penalties if Plenary Infrastructure Calgary misrepresents the monthly report, potentially leading to contractor default.

The Stoney CNG Bus Storage and Transit Facility is an availability structured deal with potential deductions in the form of service failures and unavailability failures if the operational requirements are not met. The deductions vary significantly based on the space with the utmost priority to the fuelling lanes as this is the most critical space within the facility.



The diesel fuel storage tanks outside the facility's bus storage area.

Lessons Learned

Offsite work

One aspect of the project that could have been improved (from the perspective of Plenary Infrastructure Calgary) was the inclusion of offsite work in the design-builder scope.

The offsite roadworks and stormwater management pond is not well suited for a P3 project as it follows a separate process for approvals, permitting and completion.

This created some uncertainty in terms of responsibility associated with warranty and definition of the site. This scope is not typically performed by this type of builder and is a new process that would have been better suited to parties familiar with this work. Inclusion of this scope leads to duplication of securities (i.e. Performance Security). While the City of Calgary recognized the challenge, due to the project delivery timeline, the work was included in the project agreement. Consequently, the city provided significant support to the consortium throughout the process.

Partner communication

There were clear and open lines of communication with Plenary Infrastructure Calgary's management structure during construction, which provided a central and formal communication point for the City of Calgary.

On-the-ground personnel from the city and the design-builder (PCL) were also empowered to make day-to-day decisions and engage directly with each other to find solutions. The project

lead for the city also had a trailer and was on site at least three days a week.

Plenary Infrastructure Calgary maintained a high level of engagement and cooperation with the city and other stakeholders for the project.

Collective efforts to successfully deliver project

Building a facility like the Stoney CNG Bus Storage and Transit Facility is an enormous undertaking, spanning many years of hard work, dedication, and patience and achieving substantial completion and final completion can be extremely challenging. While the obligations of each party are detailed in the project agreement, they are not always co-ordinated as well as they could be, which can lead to delays.

In comparison, this project achieved substantial completion on-time and on-budget with only \$200,000 worth of deficiencies identified and logged by the parties.

The City of Calgary and Plenary Infrastructure worked collaboratively to successfully resolve all building deficiencies before final completion. Remarkably, the project achieved final completion in less than three months.

Collaboration during transition

Plenary Infrastructure Calgary's team structure facilitated a high level of integration between all members, resulting in a smooth and seamless transition from the construction period to the Maintenance and Rehabilitation (M&R) period.

This included the testing, commissioning and start-up of the various infrastructure elements, such as the specialized process equipment and the CNG Plant, as well as staff training and engagement with Calgary Transit.

The core philosophies and many of the methodologies pertaining to Plenary Infrastructure's active management approach are continuing into the M&R Period.

In addition to the experience gained by working with Johnson Controls directly on a significant number of P3 projects, lessons learned from Plenary Group's experience on other P3 projects with similar critical operational parameters, such as the East Rail Maintenance Facility and the Waterloo LRT project, were transferred to this project.

The joint management committee (the "Service Management Committee"), and Working Groups (including the FM Working Group and Utility Working Group) were established 12 months prior to substantial completion and co-ordinated the transition to the M&R period.

Similar to the other committees, the Project Co representative led the process on behalf of Plenary Infrastructure. This provided a single point of contact for the City of Calgary.

The Service Management Committee interfaced with the Design and Construction team and provided the required formal collaboration between the design, construction and M&R work streams, engaging the city, advisors and stakeholders to fully support the transition.

Concluding Comments

The completion of the Stoney CNG Bus Storage and Transit Facility in just 23 months of construction on-time and on-budget, with less than 0.7 per cent of construction changes, is a remarkable feat. That it was also done while building one of the world's largest facilities of its type, showcases why it was awarded the silver infrastructure award from CCPPP and should act as a prototype for other similar projects.

Uniting the project was a distinct vision, shared by the partners, as well as guiding principles that helped direct all aspects of planning and design.

From a financial perspective, use of the P3/AFP model transferred significant risks to the private sector partner and resulted in projected life cycle cost savings of \$162.6 million – 34.7

per cent less than the cost had the project been delivered using a traditional procurement approach.

The partners that came together to build the Stoney Transit Facility have demonstrated how experienced partners can create a project that brings together great facility design, effective risk transfer and true partnership. The facility is a flagship project for the City of Calgary that demonstrates how the P3 DBFM dynamic model can deliver high quality, essential public infrastructure on time and on budget.

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Appendix: CCPPP's National Award Case Studies 1998 - 2019

Defence

Communications Security Establishment Canada Long-Term Accommodation Project (2011)

Education

Quad at York University, Ontario (2018)
Saskatchewan Joint Use School Projects (2015)
Alberta School Alternative Procurement – Phase 1 (ASAP I), Alberta (2010)
O'Connell Drive Elementary School, Nova Scotia (1998)

Energy

Fort McMurray West 500-kV Transmission Project, Alberta (2018)
John Hart Generating Station Replacement Project, B.C. (2014)
Britannia Landfill Gas to Electricity Project, Ontario (2005)
Vancouver Landfill Gas Cogeneration Project, B.C. (2003)
Bruce Nuclear Power Facility, Ontario (2000)
Waterloo Landfill Gas Power Project, Ontario (2000)

Government Services

Archives of Ontario – Offsite Archival Storage (2006)
Cook Chill Food Production Centre, Ontario (2005)
DriveTest: Ontario Driver Examination Services (2004)
Transforming the Delivery of Ontario's Social Assistance System (2003)
Emergency Service Mobile Communications in Ontario (2000)
Electronic Child Health Network, Toronto, Ontario (1999)
Teranet, Ontario (1998)

Health

New Oakville Trafalgar Memorial Hospital, Ontario (2016)
Humber River Hospital, Ontario (2015)
BC Cancer Agency Centre for the North and Fort St. John Hospital & Residential Care Project, B.C. (2012)
Centre Hospitalier de l'Université de Montréal Project (2012)
Glen Campus – McGill University Health Centre, Quebec (2010)
Women's College Hospital Redevelopment Project, Ontario (2010)
Royal Jubilee Hospital Patient Care Centre, B.C. (2009)
VIHA Residential Care and Assisted Living Capacity Initiative, B.C. (2007)
Abbotsford Regional Hospital and Cancer Centre, B.C. (2008, 2005)
Facility Management for the Royal Ottawa Health Care Group, Ontario (2000)
Devonshire Care Centre, Alberta (2000)
Shaikh Khalifa Medical Centre, United Arab Emirates (2000)

IT Infrastructure

Connecting Small Schools in Newfoundland (2003)

Justice & Corrections

Forensic Services and Coroner's Complex, Ontario (2016)
Okanagan Correctional Centre, British Columbia (2015)
Elgin County Courthouse, Ontario (2014)
Ontario Provincial Police Modernization Project (2013)
Surrey Pretrial Services Centre Expansion, B.C. (2011)
Durham Consolidated Courthouse, Ontario (2007)
Central North Correctional Centre, Ontario (2002)
Five Corners Project, B.C. (2002)

Real Estate

Aurora College Family Student Housing, Northwest Territories (1999)
Legislative Chamber, Offices and Housing, Nunavut (1999)

Recreation & Culture

L'Adresse symphonique, Quebec (2011)
SHOAL Centre: Seniors Recreation Centre, B.C. (2004)
John Labatt Centre, London, Ontario (2002)
Skyreach Place, B.C. (2000)

Social Housing

Single Room Occupancy Renewal Initiative Project, B.C. (2013)

Transportation

Gordie Howe International Bridge Project (2019)
Tłı̨ch̓q All-Season Road Project
North Commuter Parkway & Traffic Bridge Replacement, Sask. (2018)
Iqaluit International Airport, Nunavut (2017)
Southwest Calgary Ring Road, Alberta (2016)
Disraeli Freeway and Bridges Project, Winnipeg, Manitoba (2012)
Canada Line, B.C. (2009)
Confederation Bridge, PEI (2009)
Highway 407 ETR, Ontario (2008 & 1999)
Autoroute 30, Montreal, Quebec (2008)
Northwest Anthony Henday Drive, Alberta (2008)
William R. Bennett Bridge, B.C. (2008)
Autoroute 25, Montreal, Quebec (2007)
Kicking Horse Canyon Project –Phase 2, B.C. (2007)
Golden Ears Bridge, B.C. (2006)
Anthony Henday Drive Southeast Leg Ring Road, Alberta (2005)
Sea-to-Sky Highway Improvement Project, B.C. (2005)
Sierra Yoyo Desan Resource Road, B.C. (2004)
Fredericton-Moncton Highway Project, New Brunswick (2003)
Belledune Port Authority, New Brunswick (2000)
Retendering Alberta's Highway Maintenance Contracts (2000)
Cobequid Pass Toll Highway, Nova Scotia (1998)

Water, Wastewater & Biosolids

Calgary Composting Facility, Alberta (2017)
City of Saint John Safe Clean Drinking Water Project, New Brunswick (2017)
Regina Wastewater Treatment Plant Upgrade Project, Saskatchewan (2014)
Biosolids Management Facility, Sudbury, Ontario (2013)
Britannia Mine Water Treatment Plant, B.C. (2006)
Goderich Water and Sewer Services, Ontario (2000)
Port Hardy Treatment Project, B.C. (2000)

These case studies can be obtained through CCPPP's online bookstore at: www.pppcouncil.ca/web/bookstore

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