TORONTO

REPORT FOR ACTION

Award of Negotiable Request for Proposals Doc4053424337 to Damen Shipbuilding 5 B.V. for Construction of Pax and RoPax Electric Propulsion Ferry Vessels for Toronto Island - Supplemental Report

Date: July 23, 2024
To: City Council
From: General Manager, Parks, Forestry and Recreation and Chief Procurement Officer
Wards: All

SUMMARY

At its meeting on July 2, 2024, General Government Committee (GGC) considered the recommended contract award to Damen Shipbuilding 5 B.V for the construction, delivery, commissioning and warranty of two electric propulsion vessels for the City's Toronto Island ferry service (2024.GG14.8). In preparation for City Council's consideration of the report, GGC requested that City staff present further information outlining the total life expectancy and lifecycle cost of the proposed ferry vessels including staffing, operations, fuel, electricity, parts, maintenance, and other capital costs for both the vessels and shoreside infrastructure.

This report summarizes the scope and costs anticipated for the two vessels' lifecycle, including the construction, operation and maintenance of the vessels.

The vessels in the City's existing fleet are over 60 years old. As the vessels age, the risk of substantial repair costs and service interruptions continues to increase. The existing ferry fleet has incurred costly emergency repairs and service disruptions in recent years (over $5.5 million was spent on emergency repairs in 2023).

To mitigate these challenges and costs, the City initiated the Ferry Fleet Replacement Strategy which led to the issuance of a competitive Negotiated Request for Proposals (nRFP) for the procurement of two new electric ferry vessels in July 2023. It is anticipated that these vessels will deliver notable service and operational benefits in addition to reducing the risk of costly emergency repairs, cost and usage of fuel and greenhouse gas emissions from the current diesel-powered fleet.

The total contract award value of $90,569,194 net of all applicable taxes and charges, is comprised of:

- A base cost of $79.0 million net of all applicable taxes and charges for the construction, delivery, commissioning and warranty of two vessels. This includes fixed pricing for all labour, materials, warranty, duties and taxes, transportation costs and insurance, among other inputs.

- A contingency allowance of $11.6 million net of all applicable taxes and charges, to be used if required, to cover any unforeseen costs.

Additionally, the Ferry Fleet Replacement Strategy will require the installation of new electrical charging infrastructure at Jack Layton Ferry Terminal to service the two approved vessels as well as the planned, though unfunded, replacement of the remaining two vessels in the current fleet. This project, estimated to cost $42.5 million and to be tendered this fall, also includes improvements to accommodate the berthing of the larger new vessels. It is planned as a one-time investment that will support operation of the two vessels throughout their lifespan as well as additional electric replacement ferries that may be added to the City fleet in the future.

Based on available data and projections, the anticipated annual cost of the two new vessels, inclusive of staffing, operations and routine maintenance and exclusive of savings during the warranty period, is anticipated to exceed $7.5 million.

The same annual operational costs for two existing vessels total $4.7 million in addition to annual capital costs of $3.2 million for dry docking to address the needs of the aging fleet (and over $5.5 million in 2023 due to emergency repairs). The new vessels, with new hulls, new parts, efficient electric propulsion and modern systems, are expected to reduce annual repair costs while also significantly improve service reliability.

With a greater passenger capacity, it is anticipated that the two vessels will bring in over $6.5 million in revenue or more ($1.0 million more than 2023 revenue), subject to continuing increases in demand.

The vessels are designed for a technical lifecycle (when maintenance costs begin to exceed than the residual value of a vessel) of 40-50 years at a minimum given proper maintenance.

The procurement of two electric vessels represents a significant step forward in both improvements to the ferry customer experience and advancement of the City's TransformTO Net Zero Strategy, reducing the fleet's dependence on fossil fuels while improving service reliability to a signature Toronto destination.

RECOMMENDATIONS

The General Manager, Parks, Forestry and Recreation and this Chief Procurement Officer, recommend that:

1. City Council receives this report for information.

FINANCIAL IMPACT

The total potential contract award amount for Ferry Fleet Replacement including contingency allowance is $90,569,194 net of all applicable taxes and charges ($102,343,189 including HST and all other charges $92,163,212 net of Harmonized Sales Tax Recoveries).

Funding in the amount of $81,820,480 is included in the 2024 Capital Budget and 2025-2033 Capital Plan for Parks, Forestry and Recreation for the contract award. Additional funds of $10,342,732, funded by Development Charges, will be added to the project through a budget adjustment that will be brought to City Council through the Capital Variance Report for the Four Months Ended April 30, 2024. Both the Capital Variance Report and this staff report will be before Council at the July 24, 2024 meeting. The amended 2024 Capital Budget and 2025-2033 Capital Plan for the Ferry Fleet Replacement project for Parks, Forestry and Recreation is summarized in Table 1 below.

Table 1: Financial Impact Summary (net of HST Recoveries)

WBS Element	CPR126-45-08	CPR126-50-02	Total Contract
Date of Award to December 31, 2024	$17,308,523	$4,800,000	$22,108,523
January 1, 2025 to December 31, 2025	$25,967,717	$8,200,000	$34,167,717
January 1, 2026 to December 31, 2026	$24,118,389		$24,118,389
January 1, 2027 to December 31, 2027	$11,768,583		$11,768,583
Total (Net of HST Recoveries)	$79,163,212	$13,000,000	$92,163,212

The estimated capital cost to implement shoreside infrastructure is $41,800,000 net of all applicable taxes and charges ($42,535,680 net of Harmonized Sales Tax Recoveries). This will be funded through a combination of Debt and Development Charges. Funding to support this component of the project will be added to the project through a budget adjustment that will be brought to City Council at the July 24, 2024 meeting through the Capital Variance Report for the Four Months Ended April 30, 2024 before Council.

The estimated annual revenue and operational costs of the new vessels are outlined in Table 2. Any changes to the operating budget for ferry operations will be submitted through future budget submissions for Council consideration and approval.

Table 2: Estimated Annual Revenues and Expenditures of Two New Vessels (Years 1 to 5)

Annualized Amounts	Two New Electric Ferries	Notes
Revenues	$6,508,308	1.58 to 1.65 million passengers anticipated once both vessels are operational
Maintenance	$132,908*	Reduction in annual routine engine maintenance; annual preventative maintenance included.
Staffing	$6,861,372	Subject to change based on Transport Canada manning requirements. Assumption that additional staff will be required for larger vessels with higher capacities.
Fuel	$0	
Charging	$368,542	Charging is estimated based on the existing ferry schedule, which may be subject to change once new ferries are integrated in the fleet.
Parts	$166,667*	Estimated annual vessel battery replacement costs and other Vessel Electrical System costs.
Total Expenditures	$7,529,489	
Net Expenditures	$1,021,181*	

* Maintenance and parts costs are estimated to be less during two-year warranty period for propulsion, battery and electrical systems (Years 1 and 2)

Total annual revenue in Year 1 is estimated to increase by $1.0 million compared to 2023. The estimated operational costs outlined in Table 2 are approximately $2.8 million more than the total of the same operational cost items for two existing vessels ($4.7 million total). The vast majority of the greater annual cost is driven by the cost of increased staffing due to larger vessels and Transport Canada regulation. These operational costs are exclusive of the capital costs of dry docking. In recent years, the

annual dry docking budget has been increased from $450,000 to over $3.2 million to address the needs of the aging fleet; actual expenditures exceeded $5.5 million in 2023 due to emergency repairs. As aging vessels are removed from the fleet, dry docking costs and the risk of unexpected repair costs are anticipated to be greatly reduced.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial implications as presented in the Financial Impact section.

DECISION HISTORY

At its meeting on July 2, 2024, General Government Committee approved an amendment to Purchase Order Number 6044203 with Concept Naval Experts Maritimes Inc. of $3,503,000 net of applicable taxes and charges ($3,564,653. net of Harmonized Sales Tax recoveries), revising the current purchase order from $5,843,221 net of all applicable taxes and charges ($5,946,062 net of Harmonized Sales Tax recoveries) to $9,346,221 net of all applicable taxes and charges ($9,510,715 net of Harmonized Sales Tax recoveries) for provide contract administration services for the construction of two new ferry vessels and support services for associated shoreside infrastructure work.
https://secure.toronto.ca/council/agenda-item.do?item=2024.GG14.7

At its meeting on May 1, 2024, General Government Committee approved an amendment to Purchase Order Number 6044203 with Concept Naval Experts Maritimes Inc. of $1,302,500 net of applicable taxes and charges ($1,325,424 net of Harmonized Sales Tax recoveries), revising the current purchase order from $4,540,721 net of all applicable taxes and charges ($4,620,638 net of Harmonized Sales Tax recoveries) to $5,843,221 net of all applicable taxes and charges ($5,946,062 net of Harmonized Sales Tax recoveries), and to extend the contract term from December 31, 2025 to March 31, 2027 for the completion of the contract.
https://secure.toronto.ca/council/agenda-item.do?item=2024.GG12.5

At its meeting on February 14, 2024, City Council approved the 2024-2033 Capital Budget and Plan for Parks, Forestry and Recreation through item MPB15.1 (69) and additional funds of $10,000,000 for Ferry Fleet Replacement.
https://secure.toronto.ca/council/agenda-item.do?item=2024.MPB15.1

At its meeting on February 15, 2023, City Council approved the 2023-2032 Capital Budget and Plan for Parks, Forestry and Recreation through item MPB4.1 (98). The $14,000,000 from the third replacement vessel is reallocated to the cost of constructing the first two vessels. No additional funding is allocated to the overall budget.
https://secure.toronto.ca/council/agenda-item.do?item=2023.MPB4.1

At its meeting on February 17, 2022, City Council approved the 2022-2031 Capital Budget and Plan for Parks, Forestry and Recreation through item EX30.2 (177), $10,950,000 to invest in shoreside infrastructure and $28,942,000 added to the cost of the first two fully electric replacement vessels. The majority of the cost of the third replacement vessel ($18,600,000) is identified on the Capital Needs Constraints Unfunded List.
https://secure.toronto.ca/council/agenda-item.do?item=2022.EX30.2

At its meeting on January 14, 2022, General Government and Licensing Committee approved an amendment to Purchase Order Number 6044203 of $2,689,565 net of applicable taxes and charges ($2,736,901 net of Harmonized Sales Tax recoveries), revising the Purchase Order value to $4,540,721 net of all applicable taxes and charges ($4,620,638 net of Harmonized Sales Tax recoveries) for the Provision of Design and Construction Support Services for the Delivery of Two Electric Ferries and Associated Shore-side Infrastructure, which confirmed the switch from hybrid to fully electric vessels.
https://secure.toronto.ca/council/agenda-item.do?item=2022.GL28.1

At its meeting of March 5, 2019, General Government and Licensing Committee approved an amendment to Purchase Order Number 6044203 of $767,364 net of applicable taxes and charges ($780,870 net of Harmonized Sales Tax recoveries), revising the Purchase Order value to $2,041,720 excluding all applicable taxes and charges ($2,077,654 net of Harmonized Sales Tax recoveries) for the inclusion of design modifications and an option for the design of a second passenger only vessel.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.GL2.7

At its meeting on February 12, 2018, City Council approved the 2018 Capital Budget for Parks, Forestry and Recreation through item EX31.2 (20a.i.). $18,350,000 was added to the 10-year Capital Plan to increase funding for the two replacement vessels and add funding for a third replacement vessel.
https://secure.toronto.ca/council/agenda-item.do?item=2018.EX31.2

At its meeting on August 3, 2016, Bid Committee adopted item BD94.11 to award Request for Proposal Number 9117-15-0142 for the total design and construction support services for the construction of a new City of Toronto Marine Services passenger and vehicle vessel and an optional second ferry for a total potential contract award, including all options, of $1,274,356 net of all applicable taxes and charges ($1,296,785 net of HST recoveries) to Concept Naval Experts Maritimes Inc.
https://secure.toronto.ca/council/agenda-item.do?item=2016.BD94.11

At its meeting on March 10, 2015, City Council adopted Parks, Forestry and Recreation's 2015 Capital Budget through item EX3.4 (23a.i.) and $11,000,000 for the Replacement of Ferry Boat Number 1. $10,150,000 was included in the 10-year Capital Plan for Replacement of Ferry Boat Number 2.
https://secure.toronto.ca/council/agenda-item.do?item=2015.EX3.4

At its meeting on January 15, 2013, City Council established a reserve called "Ferry Replacement Reserve" to provide funding for the replacement of the ferry fleet with an initial contribution of $500,000.
https://secure.toronto.ca/council/agenda-item.do?item=2013.EX27.1

COMMENTS

The staff recommendation included in item 2024.GG14.8 to award the ferry vessel contract (construction, delivery, commissioning and warranty) to Damen Shipbuilding

reflects the outcomes of a competitive Negotiated Request for Proposals (nRFP) process open to national and international suppliers. The recommendation is grounded in an analysis of the financial, operational and environmental benefits of procuring and operating new vessels including an analysis of continuing to operate the City's existing vessels.

Business Case for New Vessels

The business case for the procurement of new electric ferry vessels includes operational and environmental benefits as well as a risk analysis related to operation of the existing fleet.

While all the existing vessels are well maintained, the vessels in the City's current fleet are between 61 and 114 years old, beyond the industry standard lifespan of freshwater vessels. As the vessels age, the risk of unexpected failure and substantial and unexpected repair costs continues to increase. In the past year, the City has experienced two ferry vessels being in dry dock for extended repairs impacting service capacity. Whereas PFR historically budgeted $450,000 annually for drydock repairs, in 2022 and 2023 emergency repairs cost $2.4 million and $5.5 million respectively, with additional unexpected repair costs incurred in 2024 on the Thomas Rennie.

The *Toronto Islands Residential Community Stewardship Act* legislates that the City must provide year-round ferry service to and from Toronto Island. The City's fleet currently transport over 1.49 million passengers annually with demand increasing. Through replacement of the fleet, the City is committed to improving customer service and transportation outcomes for passengers, surpassing current service levels in peak season and improving all-season access to Toronto Island, limiting unexpected disruptions due to maintenance and incorporating modern amenities and new technologies into the vessels.

Impact of Design and Specification Changes

The Ferry Fleet Replacement Strategy has evolved from diesel to hybrid diesel-electric technology and, since 2022, to the full electrification of the vessels. This evolution has been informed by:

- New and more efficient technologies in marine design and ferry operations;
- Council direction related to TransformTO Net Zero Strategy and municipal fleet electrification;
- Increased capacity requirements; and
- Stakeholder feedback.

Council approved two critical changes to the design direction and funding since the preliminary funding was allocated in March 2015:

- In 2019, Council approved changes to the ferry design direction to pursue a "dual design" fleet replacement option, which included both a vehicle and passenger vessel and a passenger-only vessel, and direction to explore hybrid and fully electric options rather than diesel-only vessels.

- In 2022, Council approved a further shift in the design direction from hybrid to full electrification of the vessels and the development of the necessary shoreside infrastructure, in keeping with the Council-adopted TransformTO Net Zero Strategy. This required further changes in the design and additional consultation with stakeholders and regulators to develop the new specifications.

As with any capital project, designs reflect the needs and feedback of stakeholders, residents and elected officials. In the case of the ferries, as changes in the technology and propulsion system were considered, so too were changes requested and recommended to the passenger areas. For example, the earliest designs did not incorporate the upper decks or the resulting increased capacity and improved passenger comfort of the current designs.

Budget allocations in the earliest phases are not comparable to more recent updates, which are based on the final recommended design and pricing negotiated with industry suppliers. Industry-wide cost escalations are also a factor in the increasing cost estimates for construction over time.

Contract Award to Damen Shipbuilding

Staff recommended awarding the contract for the two new vessels to Damen Shipbuilding as the result of a competitive procurement process inclusive of a detailed evaluation of supplier capacities, capabilities, historical experience, project plans, and pricing. The proposed contract with Damen includes construction of the vessels at Damen's shipyards in Galati, Romania. The vessels are proposed to be constructed beginning in the fourth quarter of 2024. Transportation of the new vessels to Toronto is presently proposed for the fourth quarter of 2026 (passenger and vehicle vessel) and the second quarter of 2027 (passenger vessel).

The total contract award for construction, delivery, commissioning and warranty excluding the contingency allowance is $79,004,155 net of all applicable taxes and charges. This includes fixed pricing for each vessel inclusive of all labour, materials, applicable duties and taxes, travel and carriage costs, insurance, all overhead, testing and trials, subject to the City executing the agreement by August 2024.

Additionally, the contract award value includes a contingency allowance in the amount of $11,565,038 (14.6% of the base contract). The contingency amount will be used to cover the cost of deviations, including but not limited to changes requested by Transport Canada and/or naval classification agencies and coordination with third-party operators for vessel transportation from the shipyard to Toronto.

Ferry Construction and Delivery

The construction process consists of several key stages, each integral to the successful completion and operation of the vessel:

- Verification, validation and adoption of the vessel design package
- Engineering and procurement of materials

- Production
- Commissioning and sea trials
- Transport
- Training
- Warranty

Each stage of the construction and commissioning phase will be monitored by both City staff and the City's naval architecture consultants, Concept Naval, including a supervisory team and on-site authorized representatives at the Damen shipyard. The agreement negotiated with Damen includes provisions for refund guarantees and damages should the contract be terminated for cause by the City.

The independent cost of transportation of each vessel to Jack Layton Ferry Terminal and a 24-month warranty period for the propulsion system, batteries and vessel electrical system provide significant advantages in terms of predictability for budget planning.

By stipulating fixed pricing, the contract also mitigates the risk of price fluctuations in the currency market (EURO/CAD). This approach allows for more accurate forecasting and management throughout the construction process.

Ferry Operations

Over the past few years, the ferry fleet has experienced a notable increase in ridership. In 2019, more than 1.2 million tickets were sold, generating over $9 million in gross revenue. From 2019 to 2023, annual ridership has grown by 19 per cent, leading to a 31 per cent increase in revenue from ticket sales (Table 3). This trend is anticipated to continue as the City provides additional ferry capacity through the operation of new and larger vessels.

Table 3: 2019-2023 Ticket Sales

Purchase Year	Ticket Sale Quantity	Ticket Sale Revenue
2019	1,249,725	$9,161,014
2020*	366,606	$3,271,418
2021*	782,368	$6,187,245
2022	1,346,659	$10,564,183
2023	1,491,473	$12,016,616

*2020/2021 reduced volumes are attributed to public health guidelines established during the pandemic.

With the introduction of two new ferries featuring expanded passenger capacity, ridership is expected to increase. A conservative forecast of passenger demand projects 1.58 million to 1.65 million passengers once both vessels are operational in 2027, due to the related trends of rising passenger numbers in parallel, increased use of parkland and Toronto's population growth as well as increased peak season capacity and more comfortable travel conditions in shoulder seasons. At a minimum, this would generate additional revenue of $1.0 million annually.

Revenue projections come with some uncertainties. While historical data and current trends provide a positive outlook, the actual impact of the new vessels on ridership and revenue will depend on various factors, such as economic conditions, public transportation preferences, weather, ticket pricing and changing federal regulations. Staff estimates reflect the best available data but should be interpreted with an understanding of these uncertainties.

Maintenance

The existing fleet has experienced increased annual maintenance costs due to its aging infrastructure. In addition to routine maintenance, passenger ferries must undergo dry docking on a five-year rotation for safety inspections any required repairs, in accordance with Transport Canada's Marine Safety Regulations. Additionally, annual inspections from an approved service provider are required to ensure vessels remain in compliance with all safety requirements.

During its dry docking in 2023, it was discovered that the Ongiara required extensive steelwork to repair damages to its structural hull. The cost of these unexpected repairs totalled $5.3 million, well in excess of the annual repair budget. Additionally, the Rennie underwent emergency repairs this summer that is anticipated to cost around $600,000 and was out of service for several weeks. Although the repairs are now complete and the ferry fleet's full carrying capacity restored, these situations underscore the uncertainty and potential disruptions caused by unexpected repairs in an aging fleet.

Following the delivery of the vessels, the recommended contract with Damen includes a two-year warranty period for propulsion, battery and electrical systems, exceeding the industry standard of one year. This offers reduced maintenance costs in the first two years and additional assurance, ensuring that any potential issues or defects are addressed promptly and at no extra cost to the City during the extended warranty period.

The introduction of new electric ferry vessels is expected to significantly improve service reliability by reducing maintenance downtime and offering improved operational consistency. While Transport Canada still requires dry docking, the advanced design and technology of these vessels are expected to limit repair costs. Staff also anticipate ongoing maintenance costs for the new electric propulsion system to be lower compared to servicing internal combustion engines.

The City will contract the drydocking and required repairs to new vessels through a competitive procurement process outlining, as done today, the City's specifications, requisite expertise and capacity.

Given that the Toronto ferries sail on fresh water in sheltered conditions and the new steel hull structure, the vessels are designed for technical lifecycle (when maintenance costs begin to exceed the residual value of a vessel) of 40-50 years at a minimum, given proper maintenance and standards of care.

Shoreside Infrastructure

To accommodate the new larger vessels and support their operations, including battery charging, the City is proceeding with the design, procurement and construction of shoreside infrastructure improvements at Jack Layton Ferry Terminal. This infrastructure will be in place prior to the delivery of the first vessel in late 2026.

The shoreside infrastructure scope of work, which has been developed to align with the detailed ferry vessel design, involves Toronto Hydro installing a new electrical power supply service in the right-of-way adjacent to the terminal. Under a separate construction contract, the work involves installing a duct bank structure, E-Houses for charging equipment, charging towers and cabling. Additionally, the project will include dock improvements at each berth, and installation of Dolphins for vessel stabilization while moored.

The installation of new electrical and charging infrastructure, as part of the shoreside infrastructure upgrades is planned as a one-time investment in the Ferry Fleet Replacement Strategy that will enable the complete electrification of the ferry fleet. This infrastructure will service the two new vessels throughout their lifespan and support any future vessels procured as part of the full replacement and electrification of the City ferry fleet.

Electrification

Operation of electric ferry vessels is an important initiative under the City’s TransformTO Net Zero Strategy and the goal of reducing greenhouse gas emissions to net zero by 2040. The transition from diesel ferries to an electric propulsion system will significantly reduce the ferry fleet’s greenhouse gas emissions and save the City on fuel costs. The City is actively advancing the electrification of public transportation and municipal vehicle fleets in parallel.

Parks, Forestry and Recreation collaborated with Environment and Climate to conduct a comprehensive environmental analysis of electrifying the entire ferry fleet. The transition from diesel-powered ferries to a fully electric fleet is projected to yield significant environmental and economic benefits.

Specifically, replacement of the full ferry fleet is expected to reduce greenhouse gas (GHG) emissions by approximately 2,800 tonnes annually, comparable to removing 600 cars from the road annually. The GHG reductions of the individual new electric vessels when operating will depend on the number of trips taken annually; however, each new vessel can be estimated to contribute a quarter of the estimated reductions. Vessel replacement will also have a positive impact on local air quality, water quality and climate change mitigation.

The vessel's batteries are designed to support four round trips without recharging. Each vessel will take up to six minutes to fully charge. The predictability of the Toronto Island ferries' routes and schedule and the short distances traveled provide an optimal scenario for electrification, with charging infrastructure incorporated in the ferry terminal and charging accommodated within the operating schedule. Ports Toronto has

leveraged similar benefits while operating the fully electric *Marilyn Bell I* ferry serving Billy Bishop Toronto City Airport since 2021.

Conclusion

The procurement of two new electric propulsion ferry vessels marks a pivotal investment in the City's transportation infrastructure and a significant improvement for visitors to Toronto Island, in keeping with the goals of improving access and connection in the City's Toronto Island Park Master Plan.

The two new ferry vessels are expected to provide increased passenger capacity, improved passenger experience, increased service reliability, reduced repair costs and reduced greenhouse gas emissions, local air pollution and water pollution. Some of the operational and maintenance lifecycle costs presented in this report are estimates at this time and may be influenced by regulatory changes, labour and materials cost escalation and other factors.

The cost to construct and deliver the vessels negotiated with Damen Shipbuilding includes fixed pricing and represents the outcome of a competitive procurement process.

Staff will continue to provide updates to waterfront stakeholders and local Councillors regarding the progress of shoreside infrastructure development and ferry vessel construction, delivery and commissioning and will report back to City Council as appropriate on these matters, including the naming of the vessels.

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