Report to
Rapport au:

Council
Conseil
27 February 2019 / 27 février 2019

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Submitted by
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Ward :CITY WIDE / À L'ÉCHELLE DE LA VILLE

File Number: ACS2019-TSD-OTP-0001

SUBJECT: **Contract Award of Ottawa's Stage 2 Light Rail Transit Projects and Related Matters**

OBJET: **Attribution du contrat de l'Étape 2 des projets de train léger sur rail d'Ottawa et questions connexes**

REPORT RECOMMENDATIONS

1. **That City Council receive and table the "Contract Award of Ottawa's Stage 2 Light Rail Transit Projects and Related Matters" report at its Special meeting of February 27, 2019, for subsequent consideration by Council at its regular meeting of March 6, 2019;**

2. **That, at its regular meeting of March 6, 2019, City Council:**

    a. **Receive the results of the Request for Proposals (RFP) for the Stage 2 Ottawa Light Rail Transit project, as described in this report and as overseen by a Fairness Commissioner, and related matters, including the status associated with the Environmental Assessments and approvals, and the progress achieved to date through the Memorandum of Understanding related to vehicles and maintenance for the Confederation Line East and West, as described in this report;**

b. Approve the selection of TransitNEXT as the Preferred Proponent to design, build, finance and maintain the Trillium Line Extension Project, including the bundled projects and civic works, in the manner described in this report, including as follows:

i. The Trillium Line Extension Project;

ii. The bundled projects and civic works as follows: the Ellwood Diamond Grade Separation; the Rideau River Pedestrian Bridge; the Dow's Lake Tunnel Rehabilitation; the Rideau River Trillium Line Bridge Rehabilitation; conduits; the Carleton University Tunnel; the Trinity Pedestrian Bridge and Station at Bayview Avenue; the power pack and transmission overhaul; the year-8 Alstom vehicle overhaul; the existing Trillium Line Station enhancements; the Trillium Line Bridge over Sawmill Creek; and, the Trillium Line signal upgrades; and

iii. The Airport Link.

c. Approve the selection of the East-West Connectors as the Preferred Proponent to design, build and finance the Confederation Line Extension Project, including the bundled projects and civic works, in the manner described in this report, including as follows:

i. The Confederation Line East and West Extensions;

ii. The Confederation Line East Extension bundled works and civic projects, as follows: Montreal Road Bridge; Jeanne D'arc / OR 174 Bridge Repairs; Trim Park and Ride; OR 174 / Shefford Road Watermain Crossing; OR 174 Non-OLRT Culverts; OR 174 Integrated OLRT Culverts; OR 174 Sound Barriers; Pedestrian and/or Cycling Projects Outside LRT Scope; OR 174 Concrete Removal; OR 174 / Greens Creek culvert replacement; OR 174 Intelligent Transportation Systems; City Traffic Operations – Fibre-optic Breakout Points; Bus layups on Jeanne d'Arc Boulevard; and

iii. The Confederation Line West Extension bundled projects and civic works, as follows: West Transitway North and South Rock Wall; Storm/Sanitary Sewer Upgrades Pinecrest Creek; Storm/Sanitary Sewer Upgrades for Richmond Road Complete Streets; Baseline Station Surface Improvements; Goldenrod Bridge; City Traffic Operations – Fibre-optic Breakout Points; Woodroffe Avenue Stormwater Pond (Design, EA, Implementation); Bridge enhancements at Moodie Drive; and, Algonquin College Pedestrian Bridge; and

d. Direct staff to continue to review and evaluate the Stage 2 Light Rail Transit project to achieve cost savings through design efficiencies.

3. **Approve the budgets and funding sources for the Stage 2 Light Rail Transit project as follows, and subject to funding received from the federal and provincial governments and the execution of the related contribution agreements, and other sources, as described in this report.**

    a. The $4,657,445,229 Ottawa's Stage 2 Light Rail Transit Projects budget and funding sources as outlined in this report;

    b. The funding model for the 3.4 kilometre Limebank Road extension for the Trillium Line, as described in this report and including a $50 million contribution from the Province of Ontario and an additional $30 million contribution through area-specific development charges;

4. **Delegate authority to the City Manager to negotiate, finalize, execute, deliver, amend and extend the Trillium Line Extension and Confederation Line Extension Project Agreements and associated ancillary agreements, including executing the federal and provincial contribution agreements, for the Stage 2 Ottawa Light Rail Transit project, in accordance with, and subject to, the conditions described in this report;**

5. **Approve the City's payment and other related obligations under the Project Agreements for Confederation Line Extension and Trillium Line Extension Projects, both during the construction term, and the maintenance and service term for Trillium Line, as described in this report;**

6. **Delegate authority to the City Treasurer to take any further steps, and carry out any further acts, as may be necessary to give effect to the approved budgets and funding sources for the Stage 2 Ottawa Light Rail Transit project, and the transition and the project contingency, subject to the terms and conditions described in this report;**

7. **Receive the summaries of the key terms of the complex agreements with the National Capital Commission, Canadian Property Holdings (South Keys) Inc. and Calloway REIT (South Keys) Inc., and the Ottawa Macdonald-Cartier International Airport Authority as described in Appendix 1, and approved under delegated authority and approve the following:**

    a. Delegate to the City Manager with the concurrence of the General Manager, Corporate Services and City Treasurer the authority to execute a Memorandum of Agreement with Carleton University as described in this report and summarized in Appendix 1.

    b. Delegate to the City Manager with the concurrence of the General Manager, Corporate Services and City Treasurer the authority to

execute an Agreement with Algonquin College as described in this report and summarized in Appendix 1.

c. Delegate to the City Manager with the concurrence of the General Manager, Corporate Services and City Treasurer the authority to execute a Memorandum of Agreement with Public Works and Government Services Canada as described in this report and summarized in Appendix 1.

d. Delegate to the City Manager with the concurrence of the General Manager, Corporate Services and City Treasurer the authority to execute a Crossing Agreement with VIA Rail Canada Inc. to permit the construction of a grade separation at Ellwood as described in this report and summarized in Appendix 1.

8. **Delegate to the General Manager, Planning, Infrastructure and Economic Development Department, the authority to finalize and execute the financing agreement with Riverside South Development Corporation in respect of the Trillium Line Extension Project of Light Rail to Limebank Road, as described in this report.**

9. **Approve the following measures to facilitate the construction of the Stage 2 Ottawa Light Rail Transit project, as described in this report:**

a. Delegate the authority to the General Manager, Transportation Services, to negotiate, approve, execute, deliver, amend and extend the Utility Works Infrastructure Letter of Agreement with Hydro Ottawa Limited, subject to the terms described in this report;

b. Approve the tipping fee structure for soil and excavated material as outlined in this report; and

c. Delegate the authority to the City Clerk and Solicitor to amend any by-laws, processes or policies to give effect to the decisions of Council related to this project, and to place any resulting amending by-law on the agenda of the City Council meeting in Q2, 2019, for enactment to amend Light Rail Regulation By-law 2015-301 as described in the report.

RECOMMANDATIONS DU RAPPORT

Que le Conseil :

1. Reçoive et dépose le rapport intitulé Attribution du contrat de l'Étape *2* des projets de train léger sur rail d'Ottawa et questions connexes à sa réunion spéciale du 27 février 2019 et qu'il l'examine subséquemment à sa réunion ordinaire du 6 mars 2019.

2. Qu'à sa réunion ordinaire du 6 mars 2019, le Conseil :

a. Reçoive les résultats du processus de demande de propositions (DP) pour l'Étape 2 du projet de train léger sur rail d'Ottawa, comme décrit dans le présent rapport et supervisé par un commissaire à l'équité, et les questions connexes, notamment l'état associé aux évaluations environnementales et aux approbations, ainsi que le progrès réalisé jusqu'à présent par le biais du protocole d'entente en ce qui a trait aux véhicules et à l'entretien pour la Ligne de la Confédération Est et Ouest, comme décrit dans le présent rapport.

b. Approuve le choix de TransitNEXT en tant que promoteur privilégié pour concevoir, construire, financer et entretenir le Projet de prolongement de la Ligne Trillium ainsi que les projets regroupés et les travaux civiques de la manière décrite dans le présent rapport, et notamment ce qui suit :

i. Le projet de prolongement de la Ligne Trillium ;

ii. Les projets regroupés et travaux civiques suivants : étagement du croisement en oblique d'Ellwood ; passerelle pour piétons de la rivière Rideau ; réfection du tunnel du lac Dow ; réfection du pont de la Ligne Trillium enjambant la rivière Rideau et des conduites ; réfection du tunnel de l'Université Carleton ; passerelle piétonnière de la station Trinity à la hauteur de l'avenue Bayview ; remise en état du bloc d'alimentation et de la transmission ; remise en état des véhicules Alstom à l'an 8 ; amélioration des stations de la Ligne Trillium ; pont de la Ligne Trillium enjambant le ruisseau Sawmill ; et mise à niveau de la signalisation de la Ligne Trillium ;

iii. Le lien ferroviaire vers l'aéroport.

c. Approuve le choix de Connecteurs Est-Ouest en tant que promoteur privilégié pour concevoir, construire et financer le Projet de prolongement de la Ligne de la Confédération ainsi que les projets regroupés et les travaux civiques, de la manière décrite dans le présent rapport et notamment ce qui suit :

i. Les prolongements vers l'est et vers l'ouest de la Ligne de la Confédération ;

ii. Les projets regroupés et travaux civiques du projet de prolongement vers l'est de la Ligne de la Confédération suivants : pont du chemin de Montréal ; réparation du pont du boulevard Jeanne d'Arc et de l'autoroute 174 ; parc-o-bus Trim ; point de franchissement de la conduite d'eau principale du chemin Shefford à l'autoroute 174 ; ponceaux de l'autoroute 174 hors de

la portée des travaux du TLRO ; ponceaux de l'autoroute 174 intégrés aux travaux du TLRO ; écrans antibruit de l'autoroute 174 ; projets pour piétons et cyclistes hors de la portée des travaux du TLRO ; enlèvement du béton de l'autoroute 174 ; remplacement du ponceau de l'autoroute 174 et du ruisseau Greens ; systèmes de transport intelligents de l'autoroute 174 ; circulation routière de la ville – points de sortie des canalisations de fibres optiques ; zones d'arrêt d'autobus sur le boul. Jeanne d'Arc ;

iii. **Les projets regroupés et travaux civiques du projet de prolongement vers l'ouest de la Ligne de la Confédération suivants : muret de pierre des côtés nord et sud du Transitway Ouest ; réfection des égouts pluviaux et séparatifs du ruisseau Pinecrest ; réfection des égouts pluviaux et séparatifs des rues complètes du chemin Richmond ; amélioration de surface de la station Baseline ; circulation routière de la ville – points de sortie des canalisations de fibres optiques ; bassin de rétention des eaux pluviales de l'avenue Woodroffe (conception, ÉE, mise en œuvre) ; amélioration du pont de la promenade Moodie ; passerelle piétonnière du Collège Algonquin.**

d. **Demander au personnel de continuer d'examiner et d'évaluer l'Étape 2 du projet de train léger sur rail afin de réaliser des économies en améliorant l'efficacité de la conception.**

3. **Approuve les budgets et les sources de financement pour l'Étape 2 du projet de train léger sur rail comme suit, sous réserve d'un financement obtenu des gouvernements fédéral et provincial et de l'exécution des ententes de contribution correspondantes et de fonds obtenus d'autres sources, comme décrits dans le présent rapport.**

   a. **Le budget de 4,657,445,229 $ l'Étape 2 des projets de train léger sur rail d'Ottawa et les sources de financement définis dans le présent rapport ;**

   b. **Le modèle de financement pour le prolongement de 3,4 kilomètres de la Ligne Trillium jusqu'au chemin Limebank, comme décrit dans le présent rapport et comprenant une contribution de 50 millions de dollars provenant du gouvernement de l'Ontario et un montant supplémentaire de 30 millions de dollars obtenu grâce à des redevances d'aménagement propres au secteur.**

4. **Délègue au directeur municipal le pouvoir de négocier, de conclure, de signer, d'exécuter, de modifier et de prolonger les ententes du projet de prolongement de la Ligne Trillium et du projet de prolongement de la Ligne de la Confédération ainsi que les ententes accessoires associées, y compris l'exécution des ententes de contribution fédérale et provinciale, pour l'Étape 2**

du projet de train léger sur rail d'Ottawa, conformément et sous réserve des conditions énoncées dans le présent rapport.

5. **Approuve l'obligation de paiement de la Ville et autres obligations en vertu des ententes de projet pour les prolongements de la Ligne de la Confédération et de la Ligne Trillium, tant durant la construction que durant la période de service et d'entretien de la Ligne Trillium, comme décrites dans le présent rapport.**

6. **Délègue à la trésorière de la Ville le pouvoir de prendre toute autre mesure et disposition jugées nécessaires pour donner effet aux budgets approuvés et aux sources de financement pour l'Étape 2 du projet de train léger sur rail d'Ottawa, ainsi qu'à la transition et au budget relatif aux imprévus du projet, sous réserve des modalités et conditions énoncées dans le présent rapport.**

7. **Reçoive les résumés des dispositions principales des ententes complexes intervenues avec la Commission de la capitale nationale, Canadian Property Holdings (South Keys) Inc et Calloway REIT (South Keys) Inc. et l'Administration de l'aéroport international Macdonald-Cartier d'Ottawa, comme décrit à l'annexe 1, qui ont été approuvés en vertu du pouvoir délégué, et approuve ce qui suit :**

    a. **Déléguer au directeur municipal avec l'accord de la direction générale des services organisationnels et de la trésorière municipale le pouvoir d'exécuter un protocole d'entente avec l'Université Carleton, comme décrit dans le présent rapport et résumé dans l'Annexe 1.**

    b. **Déléguer au directeur municipal avec l'accord de la direction générale des services organisationnels et de la trésorière municipale le pouvoir d'exécuter une entente avec le Collège Algonquin, comme décrit dans le présent rapport et résumé dans l'Annexe 1.**

    c. **Déléguer au directeur municipal avec l'accord de la direction générale des services organisationnels et de la trésorière municipale le pouvoir d'exécuter un protocole d'entente avec Travaux publics et Services gouvernementaux Canada, comme décrit dans le présent rapport et résumé dans l'Annexe 1.**

    d. **Déléguer au directeur municipal avec l'accord de la direction générale des services organisationnels et de la trésorière municipale le pouvoir d'exécuter un accord de croisement avec VIA Rail Canada inc. afin de permettre la construction d'un saut-de-mouton à Ellwood, comme décrit dans le présent rapport et résumé dans l'Annexe 1.**

8. **Délégue au directeur général, Direction générale de la planification, de l'infrastructure et du développement économique, le pouvoir de conclure et d'exécuter l'accord de financement avec Riverside South Development**

Corporation en ce qui concerne le projet de prolongement de la Ligne Trillium du train léger jusqu'au chemin Limebank, comme décrit dans le présent rapport.

9. Approuve les mesures suivantes visant à faciliter la construction de l'Étape 2 du projet de train léger sur rail d'Ottawa, comme décrit dans le présent rapport :

a. Déléguer au directeur général, Direction générale des transports, le pouvoir de négocier, d'approuver, de signer, d'exécuter, de modifier et de prolonger la Lettre d'entente portant sur les travaux d'infrastructure liés aux services publics avec Hydro Ottawa Limited, sous réserve des conditions énoncées dans le présent rapport.

b. Approuver la structure de redevances de déversement pour le sol et les matières excavées, comme décrite dans le présent rapport.

c. Déléguer le pouvoir au greffier municipal et avocat général de modifier les règlements, les processus ou les politiques afin de donner effet aux décisions du Conseil relatives à ce projet et d'inscrire à l'ordre du jour de la réunion du Conseil au T2 2019 l'adoption de tout règlement municipal portant modification du *Règlement sur la réglementation relative au train léger* 2015-301, comme décrit dans le rapport.

EXECUTIVE SUMMARY

On March 8, 2017, City Council approved the *Stage 2 Light Rail Transit Implementation – Project Definition and Procurement Plan* report (ACS2017-TSD-OTP-0001), which established the competitive procurement process for the Stage 2 Light Rail project to provide the foundation for the National Capital Region's growth and evolution through the twenty-first century.

Stage 2, when completed, will extend the O-Train system farther south, east, and west, adding approximately 44 kilometres of new rail and 24 new stations. With the completion of Stage 2, 77 per cent of Ottawa residents will live within five kilometres of fast, efficient, clean and reliable light rail service. The system will be able to carry up to 24,000 customers per hour, per direction during peak periods to, from and through Ottawa's downtown core. Stage 2 also sets the stage for light rail service to continue to expand west to Kanata, south to Barrhaven, and north to connect with Gatineau in keeping with the priorities and phasing Council will choose for the system as part of the next Transportation Master Plan.

Just as the Stage 1 Confederation Line project will help to free Ottawa's Transit network from congestion through the downtown core, Stage 2 will improve transit trip times and reliability by extending the reach of this high capacity, convenient, accessible and comfortable LRT system farther across Ottawa's O-Train network. The number of

transfers will be reduced; and, new and improved access and connectivity will be provided to LRT. Once completed, Stage 2 LRT will take more than 900,000 rush-hour bus trips off the roads every year.

This LRT expansion will make Transit system improvements, such as freeing bottlenecks at the Sir John A. Macdonald Parkway and Highway 417 between Pinecrest Road and Lincoln Fields. Transit customers traveling from communities in the south end will also have their commute times reduced by being able to get on the Trillium Line to avoid heavily congested routes such as Albion Road, Limebank Road, Prince of Wales Drive, and Bank Street.

In the east, the successful proposal delivers the Stage 2 Confederation Line extension from Blair Station to Trim Station, with more than 12 kilometres of new rail and 5 new stations, with convenient park and ride capacity being maintained at Place d'Orléans and Trim stations. In the west, the same proposal delivers the Stage 2 Confederation Line extension from Tunney's Pasture to both Moodie Drive and Algonquin College at Baseline Station, including maintaining the park and ride at Baseline Station. This extension will add 15 kilometres of new rail line and 11 new stations.

In the south, the successful proposal to extend Stage 2 Trillium Line will increase the reach of LRT in the south from its current terminus at Greensboro Station to Limebank Road in the community of Riverside South. This extension will include an additional four-kilometre spur line, including one kilometre of double-track, to provide a connection to the Ottawa Macdonald-Cartier International Airport. In total, there will be 16 kilometres of new track, including double-tracking from Leitrim Station to Limebank Station, eight new stations, and a significant increase to the City's park and ride capacity in the south end at Bowesville Station.

Meeting Council's Direction

Beginning with the Confederation Line LRT project in 2012, Ottawa City Council committed to building a robust, reliable and affordable light rail transit system capable of supporting the city's growth over the long-term. Council specifically directed staff to develop a procurement model that set a fixed-price and schedule, and clearly defined risks, responsibilities and penalties. A private sector shared-funding model was to be used to ensure the contractor carried critical risks and taxpayers received good value for the money invested.

As part of the March 2017 report, Council determined that the procurement for the Confederation Line East and West extensions, and their related projects, would be undertaken as a design, build, finance (DBf) contract, with the Rideau Transit Group (RTG) assuming responsibility for maintaining all of the resulting assets as a single integrated system to 2048 to retain the City's current risk profile for maintenance and ensure seamless system integration across the expanded Confederation Line system. The Trillium Line extension and related works were to be tendered separately as a design build finance maintain (DBFM) contract, with the proponent holding the maintenance and asset lifecycle responsibilities for all the system assets to the end date

of 2048. At contract expiry, the private sector partner will need to hand back the assets in good condition as set out in the contract.

Staff were to develop a procurement model for both the Confederation Line East and West extensions and the Trillium Line extension, as well as their respective bundled projects. The contracts for the Confederation Line and for the Trillium Line each set out a scope to be delivered to a fixed-price and schedule with clearly defined risks, responsibilities and financial consequences for failure to perform. The private partners will, in both cases, be financing at their own risk a significant portion of the infrastructure during construction, to be paid only as works are verified complete and compliant. In the case of Trillium Line, the private partner will also retain a portion of this at-risk financing over the 27-year maintenance concession.

This report provides Council and the public with the results of the Stage 2 Light Rail Transit procurement process and makes recommendations with respect to the results of the procurement process for each of the Confederation Line and Trillium Line extensions. The report sets out the details of the scope of each extension, the projects that have been strategically bundled for the purposes of the contract, the budget, funding sources and associated spending plan. If approved, the result will be a fully grade-separated O-Train LRT network that spans nearly 64 kilometres, and includes 41 stations, 85 vehicles and 3 maintenance and storage facilities by 2025.

The report also discusses how the City will continue to build upon and leverage the strengths of the Public Private Partnership (P3) delivery model based on observations of other projects in the P3 marketplace and lessons learned on Stage 1 Confederation Line.

In March 2017, Council approved refinements to the rail alignment and the scope of the project, along with a unique procurement approach aimed at:

- Achieving the expansion of Stage 2;
- Extending the role of the City's maintenance provider on Stage 1 Confederation Line, RTG, to assist in achieving the full integration of the east and west extensions; securing the expanded fleet of vehicles required Stage 2; and,
- Leveraging maintenance and storage efficiencies.

The procurement model divided the Stage 2 project into two separate procurements to account for the particularities of extending Confederation Line under electric propulsion, and Trillium Line using a fleet of more modern diesel trains. With these approvals, staff set out to structure:

- A design, build, finance, maintain (DBFM) procurement for the Trillium Line Extension Project;
- A design, build, finance (DBf) procurement for the Confederation Line Extension Project;
- An MOU to secure additional vehicles, and expand storage and maintenance capacity at the Belfast MSF; and

- An extension of the service arrangement with RTG to maintain the vehicles, stations and assets of the expanded Confederation Line.

Significant scope has been added over time to the overall project since 2013, consistent with Council direction that expanded the network farther to increase the value and benefits of LRT to more transit customers and residents.

For example, with the support of additional federal and provincial funding, the Stage 2 scope was expanded to include the Airport Link. Confederation Line was extended from Place d'Orléans to Trim Road to serve more residents in Orléans, Cumberland and communities to the east. A move to begin the expansion to Kanata/Stittsville was also made by reaching farther west from Bayshore Station to Moodie Drive and adding a required Light Maintenance and Storage Facility (LMSF) to support this future service and offering an optimal location to service the expanded Confederation Line fleet.

With additional funding support from the Province and the development community, a 3.4-kilometre extension was added to Trillium Line from the previously planned termination at Bowesville Station to a new terminus at Limebank Road.

Rehabilitation works and upgrades to the existing Trillium Line were also added to the project's scope so as to transfer all maintenance, performance and revenue service responsibilities to the private sector partner. This scope is across the entire expanded line—from Bayview to both Limebank and the Airport.

To ensure the timely delivery of the expanded Trillium Line and acquire the additional vehicles required, the City held a separate competition to provide seven new trains. The successful supplier in this procurement was Stadler Rail AG, a large and experienced vehicle supplier, headquartered in Switzerland, offering its service-proven FLIRT vehicle. Alstom, the vehicle supplier of the electric light rail vehicles (LVRs) for Stage 1 Confederation Line, agreed to continue production of vehicles uninterrupted upon completion of the initial fleet to provide 38 additional Citadis Spirit model light rail vehicles (LRVs) for Stage 2 Confederation Line expansion through the Memorandum of Understanding (MOU) the City struck with RTG.

Rideau Transit Maintenance

This report also further details the role of RTM (Rideau Transit Maintenance — Rideau Transit Group's Maintenance affiliate) with respect to the maintenance, asset management and the hand-back regime—obligations to be achieved with respect to the state of repair of the entire system's assets before the City takes back the expanded Confederation Line.

This report details the successful proponents' design and construction plans, and corresponding schedules. It seeks approval to proceed with the execution of the contracts to move these projects forward to construction. It also lays out the roles and responsibilities of both the City and each private sector partner as captured in the specific Project Agreements (PA). The report also describes the authorities and

processes required to finalize the property acquisitions and approve third-party agreements with key project partners. Procedures for monitoring project progress, construction completion and commissioning are also detailed later in this report.

Successful Proposals

This report provides Council with the results of the RFP process, including recommending:

- TransitNEXT (TNEXT) to design, build, finance and maintain the Trillium Line Extension Project; and
- East-West Connectors (EWC) to design, build and finance the Confederation Line Extension Project.

An overview of each Proponent Teams' proposed design, construction schedule, construction methods and project costs are also provided.

Please note that throughout this report, the terms Proponent Team, Proponent, Maintenance Provider, and the actual names of the Proponents are used as appropriate to fit the context. All of these references refer to the joint venture or single entity consortiums undertaking the contractual work of the Stage 2 project.

Council's Vision

The Stage 1 Confederation Line is designed to meet Ottawa's transit challenges by building a system that seeks to integrate into surrounding communities, with links to existing cycling, pedestrian and roadways. The grade-separated system eliminates the biggest performance issue of the current bus network, which is the rush-hour traffic congestion through the downtown core. Traveling from Tunney's Pasture Station to Blair Station by LRT will be highly reliable and take less than 26 minutes, including stops. As well, the system can grow to support a train frequency of one train at least every 120 seconds during peak hours.

Importantly, the Stage 1 Confederation Line project was designed and is being built to allow for future expansion of the rail line itself and the stations. This approach will allow the system to adapt to growing ridership levels well beyond the current TMP's 2031 planning horizon. And it also set the stage for the Trillium Line and Confederation Line extensions Stage 2 will deliver.

The successful Stage 2 teams, for both the Confederation Line and Trillium Line extensions, have met all criteria identified by Council for high-quality LRT extension projects, including fully accessible and attractive LRT stations to enhance connectivity to neighbouring communities; a fixed-price for scheduled delivery; and, a system designed for low operating costs and energy efficiency.

Through the March 2017 report, Council approved the procurement process to secure private sector partners to undertake the Trillium Line and Confederation Line (east and west) extensions, as well as a maintenance agreement with RTG that included the additional vehicles along with an expansion of the Belfast Maintenance and Storage Facility required to support Stage 2 expansion of Confederation Line.

The Stage 2 competitive bid process has yielded prices higher than those originally set out in 2013 TMP estimate, even accounting for inflation. Over this three-year procurement process, a number of drivers have emerged which have increased pricing significantly. These factors include greater than average inflation for specialized construction trades, supplies and materials, as well as trade and tariff uncertainty. In addition, with the recent delays experienced in the delivery of large-scale LRT projects in Canada, the private sector is pricing and scheduling bids more conservatively across the country.

Although the overall bid prices have increased, the Stage 2 procurement process still delivered Stage 2 pricing that is, on a comparative basis, among the lowest cost per kilometre LRT projects in Canada. While the costs for the extension originally targeted have been exceeded, viewed within the 30-year transit capital plan, the City Treasurer has advised that the City can accommodate the additional financial requirement for the Stage 2 project, and by using a mix of modest adjustments to the overall transit program and funding plan, this can be done in a manner that can protect for future transit investments such as the City's planned Stage 3 extensions, which will be a subject of the City's next TMP.

As outlined in the *Long Range Financial Plan Transit Update* report (ACS2018-CSD-FIN-0003) staff will work on the City's long–term sustainability of the 30-year transit capital plan. Once the analysis is complete, staff will develop a set of adjustments to the funding strategy and finalize the Transit Long Range Financial Plan, reporting back to Council for approval before the 2020 budget directions in the fall.

The Project Agreements for both Confederation Line and Trillium Line are similar and provide the framework to ensure value for the City and to clearly define each project's risk profile. The agreements set design and performance requirements, utilities and geotechnical obligations, construction timelines, incentives, maintenance and lifecycle rehabilitation obligations (in the case of the Trillium Line Extension Project), and where applicable, systems integration requirements. Both the Trillium Line DBFM extension contract and Confederation Line DBf extension contract are described in greater detail in this report.

The procurement also provided for a series of incentives and disincentives to drive bidders to strive for even higher performance on some key issues identified by the Mayor and Council. For example, energy consumption and lower operating costs were included in the evaluation to drive whole-life design decisions. The impact of externalities on the public, like construction disruption to traffic during the build, were also included in the evaluation by effectively charging proponents for closing roads during construction.

The Project Agreements for each project outline what each of the selected private partners must deliver and their obligations and commitments by contract. In effect, each bidder proposes how they will meet a set of obligations to undertake the defined scope, bidding to the standardized contract. This was done to ensure that the terms are clear and to ensure swift financial close without lengthy negotiations, which in turn, makes it possible to move quickly to design and construction upon Council's decision.

As outlined in the RFP, the City is under strict timelines to execute the Project Agreements before the expiration of the bid validity period. With Council approval, staff will finalize the contract and expect to achieve Financial Close within the period the fixed-price proposals remain valid. For the Trillium Line Extension Project, the City must finalize and execute the Project Agreement by no later than March 29, 2019. For the Confederation Line Extension Project, the City must finalize and execute the Project Agreement by early May 2019. Both Project Agreements will be made publicly available, with customary redactions of commercially confidential elements, on the Stage 2 website, as was done with the Stage 1 Confederation Line Project Agreement.

The updated Business Case for Stage 2 LRT confirms significant benefits to the City of Ottawa. The projects will significantly contribute to local economic development, provide environmental benefits and align with the City's Transportation Master Plan and Official Plan objectives. The project will result:

- In the creation of nearly 27,000 person-years of employment (the equivalent of over 1,000 full-time jobs);
- A GDP contribution of $5.6 billion and a tax contribution of approximately $249 million (2018$);
- An annual savings for commuters of more than 13 million person-hours by 2048; and,
- Transit will save at least 11 million person-hours over the same timeframe.

With three years of planning and successful procurement development in place, Council now has the opportunity to approve the successful proponents of these two procurement processes and the funding required to build and bring to life the next significant phase of the City's long-term transit vision.

RÉSUMÉ

Le 8 mars 2017, le Conseil municipal approuvait le rapport intitulé *« Mise en œuvre de l'Étape 2 du train léger sur rail - Définition du projet et plan d'approvisionnement »* (ACS2017-DNT-OTP-0001), lequel établissait le processus d'approvisionnement concurrentiel pour la réalisation de l'Étape 2 du train léger sur rail (TLR), un projet sur lequel s'appuieront la croissance et de l'évolution de la région de la capitale nationale au cours du vingt-et-unième siècle.

Une fois l'Étape 2 achevée, le réseau de l'O-Train sera prolongé plus au sud, à l'est et à l'ouest et quelque 44 km de voie ferrée et 24 nouvelles stations s'y ajouteront. Soixante-dix-sept pour cent des résidents d'Ottawa se retrouveront alors dans un rayon de cinq kilomètres d'un service de train rapide, efficace, propre et fiable. Jusqu'à 24 000 passagers pourront être transportés par heure dans chaque direction aux heures de pointe en provenance et à destination du centre-ville d'Ottawa. L'Étape 2 prépare également le terrain pour le prolongement du service de TLR vers l'ouest jusqu'à Kanata, vers le sud jusqu'à Barrhaven, et vers le nord pour atteindre Gatineau, et ce, conformément aux priorités et au calendrier de mise en œuvre que choisira d'établir le Conseil dans le cadre du prochain Plan directeur des transports.

De la même façon que l'Étape 1 de la Ligne de la Confédération permettra au réseau de transport en commun d'Ottawa d'éviter la congestion du centre-ville, l'Étape 2, en étendant la portée du réseau, améliorera les temps de déplacement et la fiabilité de ce TLR à grande capacité, pratique, accessible et confortable. Le nombre de correspondances diminuera et le TLR aura de nouveaux points d'accès et des liaisons améliorées. L'Étape 2 une fois achevée, plus de 900 000 trajets d'autobus aux heures de pointe seront éliminés.

Ce prolongement des lignes du TLR améliorera le réseau de transport en commun de la ville, notamment en dégageant les bouchons de circulation sur la promenade Sir John A. Macdonald et l'autoroute 417, entre le chemin Pinecrest et la station Lincoln Fields. Les temps de déplacement des usagers du transport en commun en provenance des collectivités du secteur sud de la ville seront diminués, car ils pourront emprunter la Ligne Trillium et ainsi éviter des circuits hautement congestionnés, comme le chemin Albion, le chemin Limebank, la promenade Prince de Galles et la rue Bank.

Dans l'est, aux termes de la proposition retenue pour l'Étape 2, la Ligne de la Confédération sera prolongée de la station Blair à la station Trim. Plus de douze kilomètres de voie ferrée seront ajoutés et cinq nouvelles stations seront construites. Et les parcs-o-bus pratiques des stations Place d'Orléans et Trim seront conservés. Dans l'ouest, en vertu de cette même proposition, la Ligne de la Confédération sera prolongée de la station Tunney's Pasture jusqu'à la promenade Moodie et au Collège Algonquin, à proximité de la station Baseline, et le parc-o-bus de la station Baseline sera conservé. Quelque quinze kilomètres de nouvelle voie ferrée et onze nouvelles stations s'ajouteront au réseau.

Dans le sud, aux termes de la proposition retenue pour l'Étape 2, la Ligne Trillium sera prolongée vers le sud, à partir de la station Greensboro, son terminus actuel, jusqu'au chemin Limebank dans Riverside-Sud. Ce prolongement comprendra une ligne secondaire de quatre kilomètres à voie ferrée double qui fournira une liaison vers l'Aéroport international Macdonald-Cartier d'Ottawa. En tout, il y aura seize kilomètres de nouvelle voie ferrée, y compris une voie double de la station Leitrim jusqu'à la station Limebank, huit nouvelles stations, et la capacité du parc-o-bus municipal de la station Bowesville dans le secteur est sera considérablement accrue.

Respecter les directives du Conseil

Dès 2012, avec le projet de TLR de la Ligne de la Confédération, le Conseil municipal d'Ottawa s'est engagé à bâtir un réseau de train léger sur rail solide, fiable et abordable, et apte à soutenir la croissance de la ville à long terme. Le Conseil avait spécifiquement demandé au personnel d'élaborer un modèle d'approvisionnement qui établissait un prix fixe et un calendrier de réalisation et définissait clairement les risques, les responsabilités et les pénalités. La Ville devait s'appuyer sur un modèle de financement partagé avec le secteur privé afin de s'assurer que l'entrepreneur supporte les principaux risques et que les contribuables obtiennent une bonne valeur pour l'argent investi.

Dans le cadre du rapport de mars 2017, le Conseil a décidé que le contrat d'approvisionnement des prolongements vers l'est et l'ouest de la Ligne de la Confédération et de leurs projets connexes serait de type conception-construction-financement (CCF). Il a aussi déterminé que Rideau Transit Group (RTG) assumerait la responsabilité de l'entretien de tous les actifs associés au projet en tant que réseau intégré unique jusqu'en 2048, et ce, afin de conserver l'actuel profil de risque de la Ville au chapitre de l'entretien et d'assurer une intégration sans heurts dans tout le réseau élargi de la Ligne de la Confédération. Par ailleurs, le prolongement de la Ligne Trillium et ses travaux connexes feraient l'objet d'un appel d'offres distinct en tant que contrat d'approvisionnement de type conception-construction-financement-entretien (CCFE) et il reviendrait au promoteur d'assumer les responsabilités de l'entretien de tous les actifs du réseau jusqu'à la fin de 2048. À l'expiration du contrat, le partenaire du secteur privé devra restituer les actifs en bon état comme stipulé au contrat.

Le personnel devait élaborer un modèle d'approvisionnement pour les prolongements de la Ligne de la Confédération et celui de la Ligne Trillium, ainsi que pour leurs projets connexes respectifs. Les contrats des deux lignes établissaient la portée des travaux à livrer à un prix fixe et des échéanciers ainsi que des risques, des responsabilités et des conséquences financières clairement définis advenant le défaut de se conformer aux conditions de l'entente. Les partenaires privés, dans les deux cas, financeront à leurs propres risques une partie importante de l'infrastructure pendant la construction. Ils seront payés seulement au moment de l'achèvement des travaux et de la confirmation de leur conformité aux dispositions du contrat. Dans le cas de la Ligne Trillium, le partenaire privé conservera une partie des risques liés au financement pendant les trente années que durera le contrat d'entretien.

Le présent rapport informe le Conseil et le public de l'issue du processus d'approvisionnement de l'Étape 2 du projet de TLR et il contient des recommandations relatives aux résultats des deux processus d'approvisionnement, celui entourant le prolongement de la Ligne de la Confédération et celui entourant le prolongement de la Ligne Trillium. On y précise la portée des travaux de chacun des prolongements, les projets qui ont été greffés de manière stratégique au contrat, le budget, les sources de financement et le plan de financement correspondant. S'il est approuvé, il en résultera un réseau de TLR à passages entièrement étagés, s'étendant sur près de 64 km et comportant 41 stations, 85 véhicules et trois installations d'entretien et de remisage d'ici 2025.

Le rapport explique également comment la Ville continuera de tirer parti des points forts du modèle d'approvisionnement fondé sur les partenariats publics-privés (PPP) en fonction de son observation d'autres projets réalisés sous le couvert de ce modèle et de leçons tirées de l'Étape 1 de la Ligne de la Confédération.

En mars 2017, le Conseil a approuvé des modifications au tracé de la voie ferrée et à la portée du projet de même qu'une approche unique en matière d'approvisionnement, laquelle visait à :

- Réaliser l'Étape 2 élargie;
- Accroître le rôle du fournisseur des services d'entretien pour l'Étape 1 de la Ligne de la Confédération, RTG, afin de faciliter la pleine intégration des prolongements vers l'est et l'ouest au reste du réseau et d'obtenir les véhicules additionnels requis pour l'Étape 2; et,
- Doter le réseau d'installations de remisage et d'entretien.

Aux termes du modèle d'approvisionnement retenu, le projet de l'Étape 2 a été divisé en deux processus d'approvisionnement distincts afin de tenir compte des particularités propres aux deux lignes, à savoir une Ligne de la Confédération électrifiée et une Ligne Trillium utilisant des trains plus modernes à moteur diésel. Les approbations du Conseil en main, le personnel s'est employé à structurer :

- Un modèle d'approvisionnement de type conception-construction-financement-entretien (CCFE) pour le projet de prolongement de la Ligne Trillium;
- Un modèle d'approvisionnement de type conception-construction-financement (CCF) pour le projet de prolongement de la Ligne de la Confédération;
- Un protocole d'entente pour obtenir les véhicules additionnels requis et accroître la capacité de remisage et d'entretien de l'IRE de la cour Belfast; et,
- Une prolongation du contrat de service avec RTG pour l'entretien des véhicules, des stations et des actifs de la Ligne de la Confédération prolongée.

Depuis 2013, la portée de l'ensemble du projet s'est considérablement accrue, conformément aux directives du Conseil, et cela étant, le réseau s'est étendu sur le territoire et la valeur et les avantages du TLR se sont multipliés pour un plus grand nombre d'usagers du transport en commun et de résidents.

Par exemple, grâce au financement supplémentaire consenti par les gouvernements fédéral et provincial, la portée de l'Étape 2 du projet a été étendue pour inclure le lien à l'aéroport. La Ligne de la Confédération a été prolongée de la Place d'Orléans jusqu'au chemin Trim, ce qui aura pour effet de desservir un plus grand nombre de résidents d'Orléans, de Cumberland et des collectivités à l'est. Une première étape en vue d'amener le réseau jusqu'à Kanata/Stittsville a été franchie en prolongeant la ligne plus à l'ouest, soit de la station Bayshore à la promenade Moodie, et en ajoutant une installation d'entretien léger et de remisage (IELR) pour desservir cette future liaison. Il s'agit d'un emplacement optimal pour assurer l'entretien du parc de véhicules de la Ligne de la Confédération prolongée.

Grâce à des fonds supplémentaires provenant du gouvernement provincial et de promoteurs, la Ligne Trillium a été prolongée de 3,4 km. Au lieu de s'arrêter, comme prévu précédemment à la station Bowesville, le terminus se trouve dorénavant au chemin Limebank.

Se sont également ajoutés à la portée du projet des travaux de réfection et de modernisation de la Ligne Trillium de manière à ce que toutes les responsabilités afférentes à l'entretien, au rendement et au service payant relèvent du partenaire du secteur privé. Cette mesure s'applique sur l'ensemble de la ligne prolongée, soit à partir de la station Bayview jusqu'au chemin Limebank et à l'aéroport.

Afin d'assurer la livraison en temps opportun du prolongement de la Ligne Trillium et d'obtenir les véhicules additionnels requis, la Ville a lancé deux demandes de propositions distinctes pour sept nouveaux trains. Le fournisseur retenu dans le cadre de ce processus d'approvisionnement a été Stadler. Ce fournisseur de véhicules important et expérimenté, établi en Suisse, propose les véhicules FLIRT, dont la mise en service est éprouvée. Alstom, le fournisseur des véhicules légers sur rail électriques (VLR) pour l'Étape 1 de la Ligne de la Confédération, en vertu d'un protocole d'entente conclu entre la Ville et RTG, procédera sans interruption à la production de 38 VLR additionnels de modèle Citadis Spirit pour l'Étape 2, une fois la production des premiers VLR terminée.

Entretien - Rideau Transit Maintenance (RTM)

Le présent rapport précise également le rôle de RTM (Rideau Transit Maintenance, société subsidiaire de RTG chargée de l'entretien) eu égard à l'entretien, à la gestion des actifs et au processus de restitution de la Ligne de la Confédération - les obligations à respecter en ce qui concerne l'état de l'ensemble des actifs du réseau avant la reprise par la Ville en 2048 de la Ligne de la Confédération prolongée.

On y présente les plans de conception et de construction du promoteur retenu et les annexes correspondantes. On y sollicite l'approbation du Conseil en vue de procéder à la conclusion des contrats afin de passer à la phase de la construction. On y décrit également les rôles et les responsabilités de la Ville et de chacun de ses partenaires du secteur privé, conformément aux dispositions de chaque entente de projet en particulier. On y trouve également la description des délégations de pouvoir et des procédures nécessaires pour conclure les acquisitions de biens-fonds et approuver les ententes de tiers parti avec nos partenaires de projet clés. Les procédures de surveillance de l'avancement des projets, de l'achèvement des travaux de construction et de la mise en service du train y sont également décrites en détail.

Propositions retenues

Le présent rapport présente au Conseil l'issue du processus de demande de propositions (DDPO) pour l'Étape 2 du TLR et il contient les recommandations suivantes :

- TransitNEXT (TNEXT) sera chargée de la conception, de la construction, du financement et de l'entretien du projet de prolongement de la Ligne Trillium; et,
- East-West Connectors (EWC) sera chargée de la conception, de la construction et du financement du projet de prolongement de la Ligne de la Confédération.

Le présent rapport présente un aperçu des méthodes de conception, de l'échéancier des travaux, des méthodes de construction et des coûts du projet soumis par chaque équipe de promoteurs.

Veuillez noter que, tout au long de ce rapport, les termes : équipe du promoteur, promoteur, fournisseur de services d'entretien, et les noms réels des promoteurs sont utilisés au besoin selon le contexte. Ces termes font tous référence aux entreprises ou aux consortiums qui entreprennent les travaux prévus aux contrats pour la réalisation de l'Étape 2 du projet.

La vision du Conseil

L'Étape 1 de la Ligne de la Confédération a été conçue afin de pallier les problèmes du réseau de transport en commun d'Ottawa par la construction d'un réseau visant à s'intégrer aux collectivités avoisinantes grâce à des liaisons aux circuits cyclables, piétonniers et routiers existants. Le réseau à passages étagés du TLR réglera le plus important problème de rendement de l'actuel réseau d'autobus, à savoir les bouchons de circulation aux heures de pointe au centre-ville. Les déplacements de la station Tunney's Pasture à la station Blair par TLR seront très fiables et prendront moins de 26 minutes, les arrêts compris. De même, le réseau pourra se développer à une fréquence de service de 120 secondes ou moins durant les heures de pointe.

Il est important de noter que l'Étape 1 du projet de la Ligne de la Confédération a été conçue et est construite dans l'optique de permettre son prolongement futur et l'agrandissement des stations. En vertu de cette stratégie, le réseau pourra s'adapter à la croissance de l'achalandage au-delà de l'horizon de planification de 2031 de l'actuel PDT. Elle prépare aussi le terrain pour les prolongements des lignes Trillium et de la Confédération qui résulteront de l'Étape 2 du TLR.

Les équipes retenues pour la réalisation de l'Étape 2 et qui entreprendront la construction des prolongements de la Ligne de la Confédération et de la Ligne Trillium ont satisfait tous les critères de qualité élevée définis par le Conseil, notamment l'aménagement de stations de TLR totalement accessibles et attrayantes afin d'améliorer les liaisons vers les collectivités avoisinantes, un prix fixe pour la livraison et un réseau conçu en fonction de faibles coûts de fonctionnement et d'efficacité énergétique.

Dans le cadre du rapport de mars 2017, le Conseil a approuvé le processus d'approvisionnement permettant de retenir les services de partenaires du secteur privé pour la réalisation des prolongements de la Ligne Trillium et de la Ligne de la Confédération (vers l'est et l'ouest). Il a également approuvé la conclusion d'un contrat avec RTG pour l'entretien des véhicules additionnels et l'agrandissement de

l'installation de remisage et d'entretien de la cour Belfast, une mesure requise pour soutenir l'Étape 2 du prolongement de la Ligne de la Confédération.

Les prix issus du processus d'appel d'offres concurrentiel de l'Étape 2 du TLR sont plus élevés que les prix indiqués initialement dans le Plan directeur des transports de 2013, même en tenant compte de l'inflation. Au cours des trois années qu'a duré le processus d'approvisionnement, des facteurs ont émergé pour faire grimper considérablement les prix, notamment un taux d'inflation plus élevé que la normale pour les métiers de la construction, les fournitures et les matériaux spécialisés et l'incertitude au chapitre du commerce et de la tarification. En outre, vu les retards observés récemment au Canada dans la livraison de projets de TLR de grande envergure, les soumissionnaires privés sont beaucoup plus prudents dans l'estimation des prix et des échéanciers, et ce, partout au pays.

Même si le prix global indiqué dans les soumissions a augmenté, le processus d'approvisionnement pour l'Étape 2 du TLR a néanmoins débouché sur des prix pour la réalisation de l'Étape 2, si on les compare, parmi les moins élevés par kilomètre pour des projets de TLR au Canada. Même si les coûts estimés au départ pour les prolongements des lignes sont dépassés, dans la perspective du plan d'immobilisations sur trente ans du transport en commun à Ottawa, la trésorière municipale indique que la Ville a les moyens de supporter la charge financière additionnelle. Par des modifications mineures au programme général du transport en commun et au plan de financement, il sera possible de protéger de futurs investissements dans le transport en commun, comme les prolongements du réseau envisagés par la Ville dans le cadre d'une Étape 3, lesquels seront un des objets du prochain PDT de la Ville.

Comme indiqué dans le rapport de mise à jour du *Plan financier à long terme du transport en commun* (ACS2018-CSD-FIN-0003), le personnel s'emploiera à assurer la viabilité du plan d'immobilisations à long terme (sur trente ans) du transport en commun. Une fois l'analyse terminée, le personnel proposera des modifications à la stratégie de financement et mettra la dernière main au plan financier à long terme pour le transport en commun et remettra son rapport au Conseil aux fins d'approbation avant l'élaboration des orientations budgétaires de 2020 à l'automne prochain.

Les ententes de projet des lignes Trillium et de la Confédération sont similaires et servent de cadre pour assurer la valeur du projet pour la Ville et définir clairement le profil de risque de chacun des projets. Les ententes définissent les exigences de conception et de rendement, les services publics, les obligations géotechniques, les échéanciers de construction, les mesures incitatives, les dispositions liées à l'entretien et à la remise en état cyclique et les exigences en matière d'intégration des systèmes. Les contrats de type CCFE pour la Ligne Trillium et de type CCF pour la Ligne de la Confédération sont tous deux décrits en détail dans le présent rapport.

Le processus d'approvisionnement prévoyait également un ensemble de mesures incitatives et dissuasives pour encourager les soumissionnaires à rechercher un rendement supérieur sur un certain nombre d'aspects importants pour le maire et le Conseil. Par exemple, la consommation d'énergie et les faibles coûts de

fonctionnement sont des facteurs qui ont été évalués et pris en compte dans les décisions concernant la conception à long terme. Les répercussions de certains éléments externes, comme les perturbations à la circulation durant les travaux, ont été prises en compte dans l'évaluation et des frais sont imposés aux promoteurs advenant la fermeture de rues pour la construction.

Chacune des ententes de projet décrit ce que chaque partenaire privé sélectionné est tenu de fournir et ses obligations et engagements en vertu du contrat. En effet, chaque soumissionnaire a décrit comment il entendait satisfaire les obligations reliées aux travaux définis en vertu d'un contrat uniforme. Cette approche visait à faire en sorte que les clauses du contrat soient claires pour tous et à accélérer la clôture financière de manière à passer rapidement à la conception et à la construction une fois la décision prise par le Conseil et de ne pas être retardée par de longues négociations.

Comme indiqué dans la DDP, la Ville est assujettie à des échéanciers serrés pour conclure les ententes de projet avant l'expiration de la période de validité des soumissions à prix fixe. Fort de l'approbation du Conseil, le personnel conclura le contrat et procédera à la clôture financière avant l'expiration de cette période. Dans le cas du projet de prolongement de la Ligne Trillium, la Ville doit conclure l'entente de projet au plus tard le 29 mars 2019. Dans le cas du projet de prolongement de la Ligne de la Confédération, elle doit conclure l'entente de projet d'ici le début de mai 2019. Les deux ententes de projet, dont les éléments commerciaux confidentiels auront été retirés selon l'usage, seront affichées sur le site Web de l'Étape 2, comme ce fut le cas pour l'entente du projet de l'Étape 1 de la Ligne de la Confédération.

L'analyse de rentabilité actualisée de l'Étape 2 du TLR en confirme les avantages importants pour Ottawa. Les projets contribueront considérablement au développement économique local; ils comportent des avantages environnementaux; ils correspondent aux objectifs du Plan directeur des transports et du Plan officiel de la Ville et ils entraîneront :

- Une création d'emplois équivalente à 27 000 années-personnes (soit plus de mille emplois à temps plein);
- Une contribution au PIB de 5,6 milliards de dollars et une contribution fiscale d'environ 249 millions de dollars (dollars de 2018);
- Une économie annuelle pour les navetteurs équivalente à plus de 13 millions d'heures-personnes d'ici 2048; et,
- Une économie pour les usagers du transport en commun équivalente à 11 millions d'heures-personnes au moins d'ici 2048.

Suivant trois années de planification et la mise en œuvre d'un modèle d'approvisionnement réussi, le Conseil a maintenant la possibilité d'approuver les gagnants de ces deux processus d'approvisionnement et le financement requis pour construire et donner vie à la prochaine phase importante de la vision à long terme de la Ville en matière de transport en commun.

BACKGROUND

1. The Procurement Process

In March 2017, Council approved the *Stage 2 Light Rail Transit Implementation Report – Project Definition and Procurement Plan* (ACS2017-TSD-OTP-0001), which included the Recommendation:

> *"Approve the procurement model and process for the Stage 2 Light Rail Transit Project, as described in this report (3)."*

Council also approved the alignment of the Trillium Line and Confederation Line extensions; the addition of the Airport Link and a 2.5 kilometre Moodie Drive extension to the scope of the Stage 2 project; the process to identify and include bundle projects; and, the authorities required to acquire or secure necessary property requirements.

To ensure competitive tension while preserving the efficiencies available from leveraging the Stage 1 workforce and infrastructure, the report's procurement model set out the terms of an agreement (MOU) to provide for the completed Confederation Line extensions to be maintained by Rideau Transit Group (RTG). The capital works for the extension itself would be undertaken separately by a design, build, finance (DBf) model for Confederation Line. The completely separate Trillium line allowed for full design, build, finance, and maintain (DBFM) contract model to be used.

The necessary updates to the original Environmental Assessment (EA) were set out, and direction was given for staff to seek approval for those amendments. This included the conversion of the planned Moodie Transitway corridor to LRT technology. All of these amendments are now in place.
The March 2017 report also set out opportunities to further refine scope and potential design improvements:

> *"Delegate the authority to the City Manager to accept and approve changes to the Stage 2 Light Rail Transit Project design, in accordance with the principles outlined in this report, with the concurrence of the Ward Councillor and the Mayor (7)."*

2. Stage 2 Scope Changes

During the procurement process, the City augmented the project's scope to add value or further improve future service. Through consultations with stakeholders and ongoing design reviews, the overall project materially expanded. The major scope changes include:

Trillium Line Extension Project

- Four-kilometre Airport Link with an improved Airport Station location;
- 3.4-kilometre extension from Bowesville Station to Limebank Road;
- New Maintenance and Storage Facility at the Walkley Yard;

- Upgrades to the existing Trillium Line systems and assets, and responsibility for maintenance of entire alignment (new and existing) to 2048;
- Confirmed vehicle requirements adding seven Stadler FLIRT vehicles and overhaul to existing fleet;
- $67 million in bundled projects, including Ellwood Diamond grade separation; and,
- Project enhancements to improve customer experience, mitigate construction impacts, and support growth and development.

Confederation Line Extension Project

- Bayshore to Moodie extension, including grade separation at Holly Acres Road;
- Moodie Light Maintenance and Storage Facility (LMSF);
- Addition of washrooms (Lincoln Fields and Place d'Orléans);
- Addition of escalators and elevators;
- $107 million in bundled projects; and,
- Project enhancements to improve customer experience, mitigate construction impacts, and support growth and development.

In addition to increased scope, during the in-market period the location of Cleary Station was shifted into the Byron Linear Park, mirroring the planned configuration of New Orchard Station. This was done for technical and cost-saving purposes, and to better accommodate long-term City planning considerations.

As these adjustments were pursued and the project progressed, the O-Train Planning Office continued to update Council through memos and legislative reports.

The results of the RFQ evaluation and shortlist for the Confederation Line Extension Project were relayed to Council in the June 19, 2017, update memo, and the RFP for the Confederation Line was released on June 26, 2017. The RFP for Trillium Line followed on July 17, 2017.

Along with the extensions to Moodie (and LMSF) and Limebank, in September 2017, Council approved the *Stage 2 Light Rail Transit Project and Procurement Update Report* (ACS2017-TSD-OTP-0002), which also approved refinancing the long-term debt for Confederation Line to assume the position of the long-term lenders, as well as all rights afforded to them, in order to enable the execution of the MOU with RTG.

Highway 417 Unbundling

In March 2017, the City, with concurrence from the Ministry of Transportation of Ontario (MTO), recommended bundling the Highway 417 Expansion Project with the Stage 2 LRT project on the premise that constructing both projects with a single proponent on a common schedule would transfer the risks of costly delays, transit and traffic impacts, and design and construction interfaces, to the proponent. It would also create the

opportunity to coordinate the shutdown of the existing Transitway from Bayshore Station to south of Lincoln Fields Station, such that the Highway 417 expansion could assist in facilitating detours.

On March 8, 2017, Council approved the bundling of the Highway 417 Expansion Project with the Stage 2 LRT project as part of the *Stage 2 Light Rail Transit Implementation Project Definition and Procurement Plan Report* (ACS2017-TSD-OTP-0001). As with all other bundled projects, full funding was required, and the Highway 417 was to be bundled on the premise that the Province would provide a funding envelope of approximately $200 million for the delivery of the highway expansion project.

In 2018, the newly elected Provincial Government completed a capital review of major projects across Ontario, including the Highway 417 Expansion Project. As a result, the Province chose not to bundle the 417 Expansion Project (Maitland Avenue to Highway 416) with the Stage 2 LRT project.

Moving forward, the City will continue to work with the Province. Should they wish, the City will share the work completed to date to implement active mobility improvements on the MTO bridges at Maitland Avenue, Woodroffe Avenue, Pinecrest Road, Richmond Road and Moodie Drive. These active mobility measures on MTO bridges continue to be a key request of the adjacent communities, and the City hopes they will be considered when the MTO implements their future highway widening project. The City will also continue to work with the Province on coordinating any future works on Highway 417 after LRT construction is complete.

3. Guiding Principles

In March 2017, Council approved the Stage 2 LRT Project procurement model for Confederation Line as a design build finance (DBf) contract with the roles and responsibilities for RTG to be extended as the single maintainer along with Confederation Line’s core assets.

This MOU, which includes secured maintenance pricing for vehicles, track and system infrastructure, has since been executed. Work is well underway to expand the Belfast Yard Maintenance and Storage Facility (MSF). The supply and assembly of 38 additional Alstom Citadis vehicles, required for the expanded Stage 2 fleet, is also under way.

The approved procurement model also directed staff to procure the Trillium Line extension as a design, build, finance, and maintain (DBFM) project. The scope includes a maintenance concession period until 2048 with performance risk transfer for all assets, which includes the new Stadler FLIRT vehicles, the existing Alstom LINT vehicles, and all legacy system assets on both the existing line, as well as the additional extensions to the Airport and Limebank Road in Riverside South. It also transfers all lifecycle risk for new and legacy infrastructure and sets hand-back requirements for the

condition of all assets at the end of the term. This will provide important predictable cost structures for asset lifecycle costs on legacy assets.

In both cases, the procurements for the Confederation Line and Trillium Line extensions were designed and oriented by a set of guiding principles that sought to:

a. Maximize value for money and competitive pricing;
b. Obtain full integration, functionality and reliable performance throughout the system, with a strong accountability regime;
c. Hold the Stage 2 project scope within overall available budget;
d. Balance capital spend and operating cost efficiency for the lowest overall cost;
e. Maintain a single accountability framework for ensuring high system availability; and,
f. Achieve strong risk transfer in creating the new system infrastructure, and reliable operating programs and regimes.

The Confederation Line agreement sets out full risk and responsibility for system availability and performance with a set of calibrated deductions for every type of performance failure from such things as the cleanliness of doors or station escalators. Any procurement strategy to add extensions to Confederation Line had to preserve this risk transfer and extend the accountability regime to the expanded system. This extension of an existing P3 procurement adds a large amount of new infrastructure and service. The addition of this scope presented unique complexities that had not previously been addressed by any P3 procurement for LRT systems in Canada. Staff set out to protect and extend the risk transfer achieved in the Confederation Line Project Agreement to both procurements while ensuring good value for the City. A key goal was to achieve robust competition on as much of the new scope as possible while harnessing the savings from the efficient utilization of the Stage 1 Confederation Line assets.

For the Confederation Line Extension Project, this meant securing the previously referenced MOU with RTG to provide a consistent set of light rail vehicles (LRVs), an integrated train control system, and to retain RTG as the single, accountable maintainer for the entire expanded Confederation Line system. To achieve this, the vehicles will be outfitted with compatible Thales on-board train control and communications equipment as part of this agreement.

As part of retaining all maintenance and service availability risks, RTG has supported the City through the procurement process with technical expertise. RTG will continue to provide its services for design review and construction oversight through the implementation phase of the Confederation Line Extension Project.

For Trillium Line, achieving the project's guiding principles meant separately procuring the expanded fleet of diesel multiple units (DMU). To ensure the contractor works with the vehicle provider maintaining full accountability for the result, the contract for the Stadler FLIRT vehicles, although separately procured by the City will be transferred, with all risks and responsibilities to the DBFM contractor.

The Trillium Line Extension Project Agreement needed to account for both greenfield and brownfield components of the project. This meant approaching the risk transfer profile to make sure both asset classes could be conveyed to the private partner for long-term maintenance and lifecycle risk with an integrated accountability regime backstopping performance. Thus, the Trillium Line scope included not only the extensions themselves, but also assessing the condition of these assets and bidding to perform structure, system and station upgrades to the (brownfield) sections. The contract requires the private partner to assume responsibility for service availability, maintenance and full lifecycle responsibilities for all of the existing assets, system extensions and required upgrades.

4. Environmental Approvals

Provincial

Environmental Assessment (EA) approvals for every alignment adjustment or scope increase that was adopted through the evolution of the Stage 2 LRT project were undertaken on a progressive basis throughout the process. All EA adjustments are in place to support the proposed contract executions outlined in this report.

In July 2015, the *Stage 2 LRT Environmental Assessment and Functional Design Report* (ACS2015-CMR-OCM0017) received unanimous Council approval, including direction to complete the Stage 2 LRT EA process and documentation based on the functional design and to file the respective Environmental Study Reports.

As of December 1, 2016, the EAs for each of the three Stage 2 LRT Project extensions received confirmation from the Ministry of Environment and Climate Change (MOECC), of completion and approval to proceed, as outlined below:

- March 21, 2016 - Trillium Line Extension Planning and EA;
- May 25, 2016 - Confederation Line East LRT Extension; and,
- December 1, 2016 - Confederation Line West LRT Extension.

Confederation Line West LRT Extension Addendum

On March 8, 2017, Council approved the *Stage 2 LRT Project Definition and Procurement Plan Report* (ACS2017-TSD-OTP-0001) and directed staff to initiate an addendum to the West Transitway Extension EA (Bayshore Station to Moodie Drive) to advance the conversion from bus rapid transit (BRT) to LRT. The EA addendum would also identify locations for the station and a potential Light Maintenance and Storage Facility (LMSF).

On December 22, 2017, staff issued a notice of completion for the EA addendum, and received MOECC approval on February 14, 2018, to proceed with the construction and operation of the Moodie LRT Extension – Bayshore Station to Moodie Drive Project.

Trillium Line Extension Addendum

On September 13, 2017, Council approved the *Stage 2 LRT Project and Procurement Update* (ACS2017-TSD-OTP-0002) and directed staff to initiate an addendum to the approved Trillium Line Extension EA with the Ministry of the Environment, Conservation, and Parks (MECP). On September 10, 2018, staff issued a notice of completion for the EA addendum, and received MECP approval on November 5, 2018, to proceed with the construction and operation of the Limebank LRT Extension – Bowesville Station to Limebank Project.

Federal

In December 2016, the Canadian Environmental Assessment Agency confirmed that the Stage 2 LRT Extension Project is not a federally designated project under the *Canadian Environmental Assessment Act* (CEAA), and does not require the completion of a full federal EA. Following this, the City and responsible federal authorities proceeded to undertake an Environmental Effects Evaluation (EEE) as per Section 67 of the CEAA. The EEE process and review is to determine whether projects on federal lands are likely to cause significant adverse environmental effects. The City, in coordination with the National Capital Commission, has completed the EEE report and consultation with the federal authorities.

At this time, the project is identified as not having significant or adverse environmental impacts and has been signed-off by all but two federal authorities: Environment and Climate Change Canada and the Canadian Transportation Authority.

Environment and Climate Change Canada (ECCC) was initially involved in the EEE; however, they decided to undertake its own Section 67 determination directly related to their Species at Risk (SAR) permit requirements. ECCC has completed this review and internally signed off on their EEE. The City is awaiting confirmation from ECCC on their EEE review and determination.

Similarly, the Canadian Transportation Authority (CTA) is undertaking its own Section 67 determination related to the Approval to Construct a Railway Line. Final sign-off and approval is anticipated by the CTA in March 2019.

5. Confederation Line Maintenance and Storage

In July 2015, Council approved the *Stage 2 Light Rail Transit (LRT) Environmental Assessment and Functional Design Report* (CS2015-CMR-OCM-0017) that, after assessing 19 potential sites, recommended two to meet the ultimate requirements for the expanded Confederation Line system: the first, at Woodroffe Avenue (on NCC land south of Norice Street), and the second, at an expanded Belfast Yard MSF.
Since then, the Belfast MSF has been expanded to its ultimate capacity of 66 vehicles. Due to constructability and operational issues, the Woodroffe site for an alternative Light Maintenance and Storage Facility (LMSF) was found not be optimal for the City in the longer term. This led the City to search for a more optimal LMSF location, which was

ultimately found at Moodie Drive, and which was approved by Council in September 2017. The new site provided better service reliability and operational flexibility. It will also support a future LRT Stage 3 LRT extension to Kanata.

The Moodie LMSF will be built to accommodate an additional 24 vehicles opening day, with the potential for phased expansion to get to an ultimate capacity of 90 vehicles. This site can easily accommodate the needs that will be created by the future Kanata LRT project. The environmental assessment of its phased expansion is captured in the approved EA addendum for the Kanata project.

The City will continue to retain the Woodroffe site as a potential future location for a modest light maintenance and storage facility. It will likely provide further operation and reliability benefits when the City undertakes Stage 3 of the LRT extension from Baseline Station to the Barrhaven Town Centre. The Barrhaven LRT and Rail Grade Separation EA Study, currently underway, will confirm and finalize this requirement.

MSF versus LMSF

Belfast is the existing site of the Maintenance and Storage Facility (MSF) that was built and expanded by RTG for Confederation Line, while Moodie is the site of the new Light Maintenance and Storage Facility (LMSF) that will be built by EWC.

The distinction is that while an LMSF also provides vehicle storage, there is no capability to lift the vehicles, so only light maintenance programs such as seat repairs, window replacement, flooring replacement, door repair, electronic component replacement, cleaning and systems testing can be facilitated.

At Belfast, the “heavy lifting” such as engine work and wheel truing and replacement can be performed.

Belfast (MSF) Expansion and Schedule Update

Following Council approval of the MOU with RTG in March 2017, construction to expand the Belfast MSF commenced. In April 2017, the City started a tree relocation program ahead of the berm removal, which was required to extend the noise wall. Community input was received for the design of the noise wall which was completed in October 2017, with landscaping and tree planting completed by the end June.

The following major construction items provides a summary of the remaining scope of work for the Belfast MSF expansion, which will be complete by the end of Q1 2019:

- Shed Extension
- Overhead Walkway Structure (OHWS)
- 3-Metre Building Extension
- Overhead Catenary System
- Handover Platform and Related Structures

- Storage Track 38 (including temporary tent structure)
- Tracks 35, 36, 37 (NMSF), 39 (by-pass)
- New MSF

Figure 1: Belfast MSF

While the additional track work to facilitate train movements for the expanded fleet within the yard have been completed, work remains to integrate the Communications Based Train Control (CBTC) system. Like the rest of the Confederation Line system, the wayside CBTC integration is also being done by Thales and is scheduled to be complete by November 2019.

With respect to the delivery of the Stage 2 Alstom Citadis Vehicles, their status is as follows:

- LRV 35 - fully trucked complete;
- LRV 36 - cars in production and bogies are on site ready for installation;
- LRV 37 - cars are in production (fabrication); and,
- LRV 38 - underframes are being assembled.

Currently, RTG expects to have the entire expanded fleet (Remaining LRVs 39-72; 38 additional vehicles in total) assembled by Q3 2021, well in advance of when they will be required to commence testing and commissioning for the Confederation Line extensions.

Figure 2: Belfast MSF Expansion: Interior of the New Maintenance Facility

6. Business Case and Local Economic Benefits

In 2016, a Stage 2 Business Case was developed for the City of Ottawa to identify, among other things, the Cost-Benefit Ratio (BCR) of the Stage 2 LRT project. The BCR is essentially an indicator used to summarize the overall value of a project. Once calculated, a number greater than 1 indicates a positive net-present value for the project.

In 2018, prior to the results of the procurement results, the Stage 2 Business Case was updated to reflect scope changes, including the light rail corridor extensions to Limebank Road, Moodie Drive and Trim Road.

The updated Business Case calculated a Benefit-Cost Ratio (BCR) of 2.89. This makes Stage 2 one of the most positive business cases for any LRT, bus or rail project in the province.

Table 1: BCR Summary

Accounts (PV)	Stage 2 (2018$, million, rounded)
Capital Cost	$2,824
Project Operating Savings	$75
Lifecycle Costs	$77
Vehicle Operating Cost Savings	$3,239
Travel Time Savings	$4,420
Collision Cost Savings	$329
Environmental Benefits	$177
NPV	**$5,339**
BCR	**2.89**

The net benefits of expanding LRT in Ottawa are substantial. Ridership is expected to increase by over 10 million trips per year by 2031. As a corollary, Ottawa will see a

reduction of approximately one sixth of its total vehicle kilometres travelled (VKT) by 2031 with the implementation of Stage 2, and transit customers will benefit through improved speed and reliability of service.

The Business Case study finds (as compared to a scenario where Stage 2 was not implemented), that Ottawa residents will spend less time commuting with total auto users experiencing an annual savings of over 13 million person-hours by 2048. Transit passengers will experience a savings of approximately 11 million person-hours over the same timeframe.

One of the more recognized benefits of transit investment is the reduction in greenhouse gases (GHGs) and critical air contaminants (CACs), which have direct implications for the overall sustainability of municipalities urban growth and the health of residents. The 2016 Business Case estimated that Stage 2 will reduce GHG emissions by over 110,000 tonnes and CACs by over 3,000 tonnes by 2048 annually. The reductions are in addition to GHG and CAC reduction that will flow from the Stage1 Confederation Line and carry and estimated economic value of totalling over $176 million to 2048. In addition, once completed, the light rail system is expected to eliminate more than 900,000 bus trips annually during the peak periods.

The project will result in the creation of nearly 27,000 person-years of employment (the equivalent of over 1,000 full-time jobs); a GDP contribution of $5.6 billion; and, a tax contribution of approximately $249 million (2018$).

Table 2: 2018 Stage 2 LRT Business Case Scorecard

Environmental
• Reduction of over 110 thousand tonnes of GHGs and over 3,000 tonnes of CACs (including carbon monoxide, nitrous oxides, sulphur oxides and particulate matter) per year by 2048. The economic value of these reductions will total over $6 million annually by 2048 (in 2018$); and, • Reduced fuel consumption by approximately 42 million litres annually by 2048.
Economic
• Total economic output from the project is approximately $5.6 billion (2018$) and over 27 thousand person-years of employment; • Broadened tax pool will result in increased tax revenue of approximately $249 million (2018$); • $8.2 billion (2018$) over a 25-year analysis period for commuters from 2023 to 2048, including: o $3.2 billion in vehicle operating savings; o $4.4 billion in travel time savings; and, o $0.3 billion in accident avoidance savings. • $5.5 million (2018$) in annual operating savings at OC Transpo beginning in 2023**.**
Public Transit
• Implementing Stage 2 is estimated to increase transit ridership by 6.7%; • The TMP Network including Stage 2 will increase both auto trip and transit speeds in the City; transit speeds will increase by nearly 10%. • Faster speeds – due to faster headways, higher reliability, more efficient transfers, and full segregation. • More efficient boarding and improved levels of comfort and service. • Will save nearly 10 minutes from each rider's daily commute.
Strategic Fit
• Meets Provincial objectives to expand the use of public transit and transit-supportive development and enhance connectivity among transportation modes. • Provincial and Federal funds available. • Priority project within the City of Ottawa's Transportation Master Plan and supported by the City's Official Plan.

In short, the update demonstrates that the Stage 2 LRT Updated Business Case continues to reflect what was originally concluded in 2016: Stage 2 LRT provides significant quantitative and qualitative benefits to the City of Ottawa by contributing to economic development, environmental benefits and aligning with the City's Transportation Master Plan and Official Plan objectives.

7. Stage 2 Procurement Process

Request for Qualifications

The City prequalified three consortia for each of the Confederation Line Extension Project and Trillium Line Extension Project. The teams that competed were made up of some of the largest and most experienced firms in the world.

The successful shortlisted teams for the Confederation Line Extension Project included:

- *Confederation Line Transit Group* - Ferrovial, Colas and Tomlinson.
- *East-West Connectors* - Kiewit and Vinci.
- *Confederation Line 2 Partners* - Bechtel, Aecon, Pomerleau and EBC.

The successful shortlisted teams for the Trillium Line Extension Project included:

- *Trillium Link* - Acciona, Fengate, CAF, CIMA+, Momentum, Thomas Cavanagh, Cobalt Architects, GRC Architects.
- *TransitNEXT* - SNC-Lavalin.
- *Trillium Extension Alliance* - Plenary, Colas, R.W. Tomlinson, Plan Group, WSP, Bird Construction, Mass Electric.

The procurement documents set out comprehensive requirements that the project must achieve. These included covering overall system quality, ability to accommodate growing ridership, excellent initial and ongoing bus integration, along with passenger comfort and accessibility. Stations were required to ensure strong neighbourhood connectivity and accessibly, and the use of quality materials and finishes for construction.

The specific requirements were focused on ensuring system performance and achieving the desired project outcomes—dictating what must be achieved, rather than spelling out how to achieve it. The goal was to focus on high quality results and provide the flexibility to the private sector to allow creativity and innovation in the design to accomplish them. The output specifications were developed by the O-Train Planning Office and a coordinated team from across City departments. They were reviewed throughout development by stakeholders and approval authorities such as the National Capital Commission (NCC), Ministry of Transportation of Ontario (MTO), Public Services and Procurement Canada (PSPC, former Public Works and Government Services Canada), Ottawa Macdonald–Cartier International Airport (O/MCIA), and Transport Canada.

The Confederation Line Extension Project RFP was issued to the three prequalified parties on June 26, 2017. The Trillium Line Extension Project RFP followed suit on July 17, 2017, marking the commencement of the in-market period for both projects.

Procurement Schedule

Subsequent to the March 2017 report, on March 12, 2018, Council received a memo that outlined an updated procurement schedule that reflected the request for a schedule adjustment on behalf of proponents for both the Confederation Line and Trillium Line procurements. This additional time was prudent and provided several benefits to the City, including:

- Allowing proponents to further refine their proposals and provide more cost-effective pricing to ensure good value for the City by managing within the project's affordability cap;
- Offering proponents the flexibility to identify design, environmental and costing elements for the 2.5-kilometre Moodie Drive extension and LMSF, and the 3.4-kilometre Limebank Road extension;
- Allowing bundled project elements to be successfully integrated into the overall procurement, such as pedestrian and cycling connections; and,
- Offering additional time to refine agreements to reduce risks to the City, with respect to ensuring the expanded Confederation Line system operates seamlessly and transferring responsibility for the newly built extensions from the successful proponent to RTG as maintainer, and the vehicle procurement and delivery process for Trillium Line.

In response to the requests, and to help ensure adequate time for proponents to refine their bids, the procurement timeline was adjusted for both procurements such that a single contract award report for both projects would come before Committee and Council in Q1 2019.

Evaluation Process

Each of the three proposals for the Confederation Line Extension Project and the three separate proposals for the Trillium Line Extension Project were evaluated and scored through a highly structured and rigorous framework prescribed by the RFP, with performance criteria developed by Capital Transit Partners 2 (CTP2), Norton Rose Fulbright, Deloitte, and staff at the O-Train Planning Office.

This team evaluated every aspect of each RFP submission against the design, performance and quality requirements set out in the procurement documents. Details of the evaluation process and model can be found in Appendix 2.

Fairness Commissioner Observations and Findings

The entire procurement and evaluation process for both Stage 2 projects was overseen by a team of fairness commissioners from P3 Advisors, one of Canada's leading providers for Fairness Commissioners and Fairness Monitoring services.

Present throughout each phase of the process, they have certified that the RFP procurement process was clearly established in the implementation guidelines (RFP Evaluation Framework). The evaluation process and criteria described in the procurement documents were applied consistently and equitably. They have certified final evaluation discussions, confirming that evaluators demonstrated diligence in their responsibilities, that they were able to support their individual evaluation assessments and that they held no bias for or against any private sector team.

Conflict of Interest and Confidentiality were treated with the highest regard throughout the process. Attestation of no Conflict of Interest was reconfirmed by those participating in the evaluation stage of the process and new participants to the process were required to also sign Conflict of Interest attestations. There were no unresolved issues at the RFP stage of the procurement.

As the Fairness Commissioner for the RFP for the Stage 2 LRT Project (RFPs #09717-92594-P01 for Confederation Line and #09717-94065-P01 for Trillium Line), P3 Advisors certified that the principles of openness, fairness, consistency and transparency have been properly established and maintained throughout the entire process.

Conflict of Interest resolutions and reporting were addressed through the Evaluation Framework, receiving final approvals and clearance by the Fairness Commissioner and the Executive Steering Committee.

The interim Fairness Commissioner reports are attached to this report as Appendices 3 and 4. Final versions will be developed once financial close is complete.

Moving Forward to Financial Close

To ensure clear terms and rapid financial close upon selection of the winning bid(s), the proposal documents contained a complete Project Agreement (PA) that the Proponent Teams committed to as part of submitting individual bids. The PA was reviewed and refined with each competing team through multiple workshops.

The PA, and all terms, set out the clear obligations every proposal must bid to, making it possible to move quickly to design and construction upon Council’s decision without lengthy negotiations.

As outlined in the RFP, the City is under strict timelines to execute the Project Agreement before the expiration of the bid validity period, which holds the Proponent to the submitted bid price and contractual obligations. The major milestones to be undertaken by the City and TNEXT and EWC include Commercial Close and Financial Close. Commercial Close timelines are as follows:

- Trillium Line – For the Trillium Line Extension Project, the City must finalize and execute the Project Agreement by no later than March 29, 2019; and,

- Confederation Line – For the Confederation Line Extension Project, the City must finalize and execute the Project Agreement by early May 2019.

Following Commercial Close, and subject to the screening of commercially confidential information on the part of the parties, both Project Agreements will be made publicly available on the Stage 2 website as was done with the Stage 1 Confederation Line Project Agreement.

DISCUSSION

A. Applying Lessons Learned

In 2015, the City initiated, through a direction from Council, an independent review of the Stage 1 Confederation Line LRT procurement to identify opportunities to improve the Stage 2 LRT Project. Resulting from this review was a Lessons Learned Report (*Lessons Learned from Confederation Line & Stage 2 Implementation Implications*), prepared by Deloitte and Boxfish Infrastructure Group, which played an important role in the development of the Stage 2 procurement model and implementation process.

As noted, the Stage 1 Confederation Line LRT Project is being implemented using a design, build, finance and maintain (DBFM) delivery model. The project also incorporated the Highway 417 (widening from Nicholas Street to the 174/417 Split) bundling work through an agreement with the MTO.

The DBFM procurement approach used on this project is becoming more and more common, nationally and internationally, for the delivery of large, complex infrastructure projects. The delivery of LRT infrastructure is a good candidate for P3 delivery because it involves the need to bring on so many different suppliers, as well as contractors, and is complex with respect to design and construction integration.

Staff were able to incorporate several key Lessons Learned from Stage 1 into the Stage 2 project. These include:

- Improving risk transfer by proactively incorporating some key retained risks through a better early works and investigations programs and better aligning risks with current market conditions such that they are reflected in the project base scope;
- Strengthening the penalty regime related to the notification of project completion;
- Changing the public art process to create clearer language in the PA, provide more opportunities for public engagement, and establish a process whereby Public Art Program (PAP) can communicate directly with the winning proponents;
- Engaging property experts at an early stage of the planning process to identify potential challenges with specific alignments relating to property acquisition;
- Maintaining continuity and experience within the Transportation Services Department by transitioning key personnel from Stage 1 to the Stage 2 team;
- Strengthening the Project Agreement penalty regime to better incent and discipline contractor behavior;
- Improving the communications obligations, such as including the

Communications Director in working groups and having a communications lead on-site;
- Identifying and incorporating bundled projects to create financial savings and schedule efficiencies;
- Improving Mobility Matters by providing incentives to ensure limited restrictions during construction;
- Including contract provisions for maintaining pathways and other active mobility connections during construction;
- More efficiently meeting temporary property requirements for construction while better protecting the adjacent community and natural features from impacts where possible; and,
- Incorporating project elements funded through Stage 1 contingency costs as part of Stage 2's base scope where anticipated.

Winning Bid Proposals

As a result of the Request for Qualifications (RFQ) and Request for Proposal (RFP), the following proponents were selected and are being recommended as the Preferred Proponents:

- Trillium Line Extension Project – TransitNEXT (TNEXT); and,
- Confederation Line Extension Project – East-West Connectors (EWC)

Trillium Line Preferred Proponent Team – TransitNEXT

TransitNEXT is a wholly-owned affiliate of SNC-Lavalin, a global professional services and project management company. SNC-Lavalin has delivered integrated infrastructure engineering solutions for more than a century, on every continent.
Projects Under Construction by SNC-Lavalin

In addition to its role in the design, construction and long-term maintenance of the Stage 1 Confederation Line as a partner in the Rideau Transit Group, SNC-Lavalin is also involved in the following projects:

- The Réseau express métropolitain (REM) is an electric and fully-automated, light-rail transit network designed to facilitate mobility across the Greater Montreal Region. Spanning 67 kilometres of double-track with 26 stations, it is the largest public transit project undertaken in Québec in the last 50 years;
- The Eglinton Crosstown LRT includes the design, construction and maintenance of a 19-kilometre corridor—10 of which are underground—and 25 stations in Toronto's busy north end;
- The new 3.4-kilometre Champlain Bridge, one of North America's busiest spans; and,
- The John Hart Generating Station Replacement Project, North America's first P3 in the hydro sector.

Completed Construction by SNC-Lavalin

- The Canada Line is a 19-kilometre, fully-automated commuter rail line and part of Vancouver's SkyTrain network, one of the largest of its kind in the world;
- Evergreen Rapid Transit Line connects Coquitlam to Vancouver through an 11-kilometre extension to the existing SkyTrain network;
- Calgary West, including the design and construction of eight kilometres of light rail transit line in Calgary's inner city;
- Edmonton North LRT, a 3.3-kilometre extension which included construction of 3 stations;
- Highway 407 East Extension Phase 1 in Toronto, Ontario; and,
- William R. Bennett Bridge in Kelowna, BC.

Confederation Line Preferred Proponent Team (DB Co) – East-West Connectors

East-West Connectors (EWC) is a consortium of design, engineering and construction companies with extensive experience with light-rail transit systems. Through a joint venture partnership, Peter Kiewit Sons ULC along with VINCI Group and its affiliates will lead the overall project. Design engineering services will be provided by WSP Canada Group Ltd. and Hatch Ltd.

Kiewit
Kiewit Corporation, the parent company of Peter Kiewit Sons ULC traces its roots to 1884 and has been active in Canada since the early 1940s. The employee-owned organization had revenues of $8.7 billion in 2017 and employs 22,000 staff and craft employees.

Kiewit Projects

- Vancouver's Skyway;
- $350 million I-225 rail line in Denver;
- Midtown tunnel in Norfolk, Virginia, which is a P3 project comprised of a new two-lane immersed tube tunnel under the Elizabeth River; and,
- Extension of Montreal's light rail system into Laval.

Vinci Group
Founded in 1899, VINCI Group is the fifth largest global constructor with €40.9 billion of revenue in 2017 and more than 185,000 employees in more than 100 countries.

Vinci Projects

- 45 projects currently in progress in 19 countries;
- Cairo, Egypt, light rail project, which includes three different lines and over 100 kilometres of rail; and,
- Liefkenshoek rail link to ease the flow of freight traffic in the port of Antwerp, Netherlands.

WSP Canada Group Ltd.
WSP is one of the world's leading professional services consulting firms with over 7,500 employees across Canada and 36,000 globally. WSP has over 500 offices globally and specialize in transit and transportation engineering.

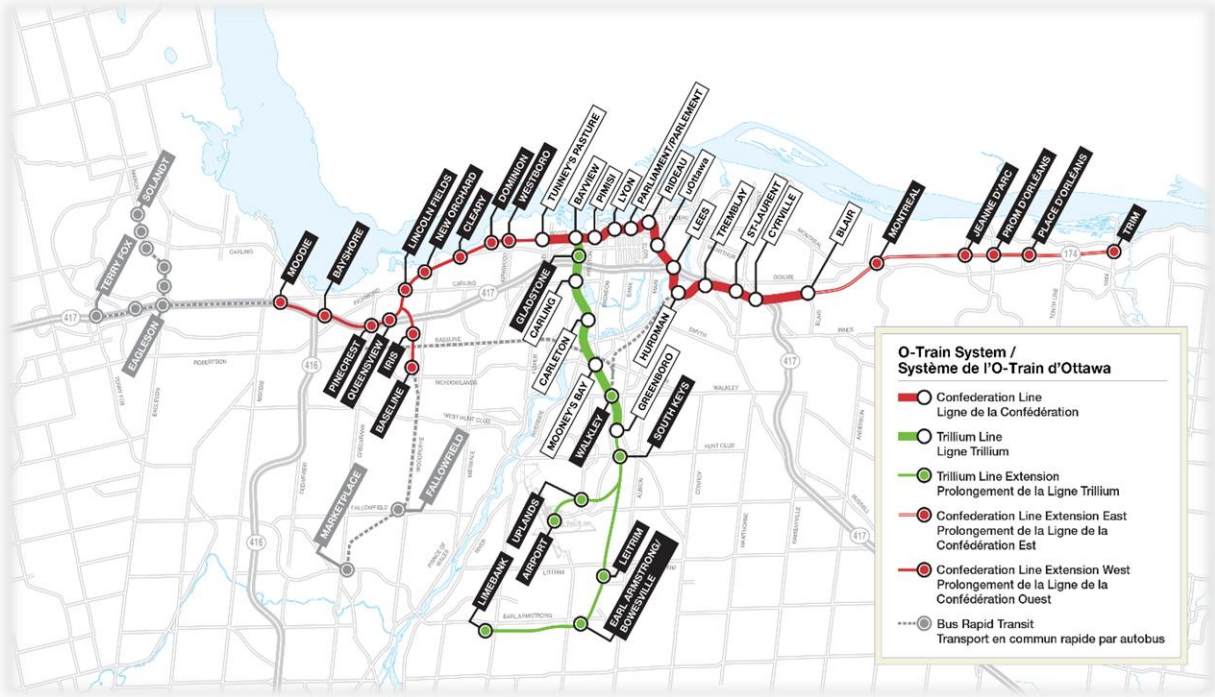
Hatch Ltd.
Founded in 1955, Hatch is a consulting engineering company, with transit and transportation consulting as its core business. Hatch has project experience in more than 150 countries, including successfully advising clients for more than 80 years, and has more than $35 billion in projects currently under management.

Based on the construction schedules provided by TNEXT and EWC, the projected completion dates for the projects are:

- Trillium Line Construction Completion (2022);
- Confederation Line East Construction Completion (2024); and,
- Confederation Line West Construction Completion (2025).

Features of the Winning Bid Proposals

Figure 3: Complete O-Train System



Trillium Line (TNEXT)

The Trillium Line Extension Project includes 8 new stations, upgrades and enhancements to the existing stations, 16 additional kilometres of track, with additional

passing tracks at South Keys and extensive portions of double-tracking south of Leitrim Road to Limebank Road. 1,900 park and ride spaces from Greensboro Station to Limebank Road in Riverside South will be available on day-one of service.

The overall alignment, for the most part, follows the existing CPR alignment, which was the same envisioned for the North-South Light Rail Transit Project to Bowesville (ACS2006-PGM-ECO-0014). Operating within the existing corridor reduces land requirements, environmental impacts and costs.

Operational enhancements to the Trillium Line

The Trillium Line Extension Project includes several operational enhancements intended to support reliable headway service, give the system more flexibility to overcome minor delays and quicker recovery times to overcome major operational delays. Key improvements include:

- Lengthening existing passing sidings;
  - Completely independent alignment from South Keys to the Airport
- Providing extensive portions of new double-track;
- Improving track geometry;
- Providing two-track terminal stations at both Bayview and Limebank; and,
- Grade separating the Ellwood Diamond allowing VIA trains to pass below the Trillium Line with no impact to service.

All three existing passing sidings at Gladstone, Carleton and Brookfield will be lengthened to enhance operations. The entire 6-kilometre section of track from Leitrim Station to Limebank Station will also be double-tracked. The terminal stations at Bayview and Limebank will be double-tracked such that an out-of-service train could be parked at the station while the line remains in operation.

The Indusi system that supports the current operations is a safe and reliable system but since its inception, extensive technological advances have been made and will be adapted with a more modern and advanced Signal & Train Control System.

Numerous upgrades will be performed at all existing Trillium Line stations, including the provision of new platforms, which will be re-constructed and lengthened to 77 metres to accommodate the longer Stadler trains. Additionally, the signage, lighting and communications systems will also be upgraded at these stations. An additional elevator will be added to Carling Station to provide redundancy.

Several new bridges for cyclists and pedestrians will also be constructed as part of the Trillium Line Project.

- Pedestrian bridge at Bayview Station to link the station with the development at 900 Albert Street;
- Multi-use bridge (cycling and walking) over the Rideau River at Carleton University to provide better access to Carleton Station;
- Multi-use bridge (cycling and walking) over Hunt Club Road to connect the north-south MUP network; and,
- New bridge that will also function as a wildlife crossing at High Road.

Handover of Existing Line and Fleet

As part of the Trillium Line design build finance and maintain (DBFM) contract, maintenance responsibilities for all of Trillium Line's existing civil infrastructure and rolling stock are to be transferred to TNEXT. This enables a single accountability framework on TNEXT for maintenance, and service availability and performance of Trillium Line as a whole, while avoiding any interface challenges that would otherwise surface between the new and old line.

To facilitate this handover, a complete shut-down of Trillium Line service, commencing May 2020, is required to perform such things as:

- Rehabilitation, enhancement and construction of track and drainage;
- Rehabilitation of structures such as the Rideau River Bridge;
- Construction of two new stations as well as performing improvements and upgrades to existing stations;
- Provision of a new Signal &Train Control System;
- Provision of new communications systems;
- Upgrades to the Dow's Lake tunnel;
- Extensions to existing passing tracks;
- Upgrades and retrofit of the existing fleet of six Alstom LINT vehicles; and,
- Construction of a new Ellwood Diamond Grade separation to allow VIA trains to pass below the Trillium Line.

Additionally, other projects are also taking advantage of the Trillium Line shut-down. For example, the MTO are planning to replace the Trillium Line 417 overpass with a new single span structure during this closure. Carleton University is also using this window to add three stories to the parking facility located overtop the Trillium Line, as well as adding a portion of underground tunnel below the tracks for future connection to their tunnel system (the pedestrian tunnel is bundled with the Stage 2 works).

Airport Link

The Airport Link is a 4-kilometre branch line connecting the Trillium Line to the Ottawa Macdonald-Cartier International Airport, including two new stations: Uplands Station and Airport Station. The Airport Link will run on its own track distinct from the Trillium Line mainline from South Keys Station south to terminate at an elevated Airport Station connected to the passenger terminal building at the departures Level. The Airport Link elevated guideway structure will be adjacent and visually compatible with the existing elevated roadway structure. To meet expected ridership demand, the Airport Link will operate with single-vehicle trains (Alstom LINT) to Uplands Station and Airport Station on the same 12-minute frequency as the Trillium Line and will operate as a shuttle between Airport Station and South Keys Station. This will require a transfer at South Keys Station for passengers connecting to the Trillium Line, which will be timed to minimize trip times.

While the Airport Link civil and track infrastructure will protect for direct-to-Bayview service, this scenario would force a transfer on passengers travelling north of South Keys Station. Due to the much higher passenger volumes going to or from Limebank Station, this operational scenario is unlikely and would only be possible at off-peak periods.

The existing South Keys Station on the Transitway will be expanded to include a new train platform where an efficient cross-platform transfer can be made from mainline Trillium Line trains to the Airport Link trains. South Keys Station will also serve as the bus transfer station from the Southeast Transitway to both Trillium Line and Airport Link trains.

Further details of the Airport Station can be found in Appendix 5 (Station Descriptions).

The projected incremental ridership to the airport is expected to be initially low, and as such, will result in a net operational cost pressure for the City (estimated to be $4 million per year). The Airport Authority has agreed to provide the lands for the Airport Link as an in-kind contribution to the project. This in-kind investment has an approximate value of $7.5 million. Additionally, the Airport Authority will be undertaking a terminal expansion to connect the departures level concourse area with the Airport Station to provide a seamless and weather protected route to the Trillium Line from the passenger terminal building. This expansion is also considered a contribution to the project and estimated to cost approximately $17 million.

The City has entered into an MOU with the Ottawa Macdonald-Cartier International Airport Authority with the following:

- Airport Authority’s commitment to sublease or license to the City the Airport Link Lands at nominal cost;
- Delineation of the interface between the Airport Station platform (City responsibility) and the Airport Station concourse (Airport Authority responsibility), as well as a high-level scope of both projects;

- A high-level schedule such that construction works of both parties are co-ordinated; and
- Commits the City to operating the Airport Link at the same frequency as the Trillium Line mainline (every 12 minutes) for at least two years following service commencement.

Trillium Line Benefits

With the improved scope now captured in the Stage 2 project, the City has an opportunity to build a system that will be fully integrated with Confederation Line to create an expanded O-Train Network system that is more uniform and reliable.

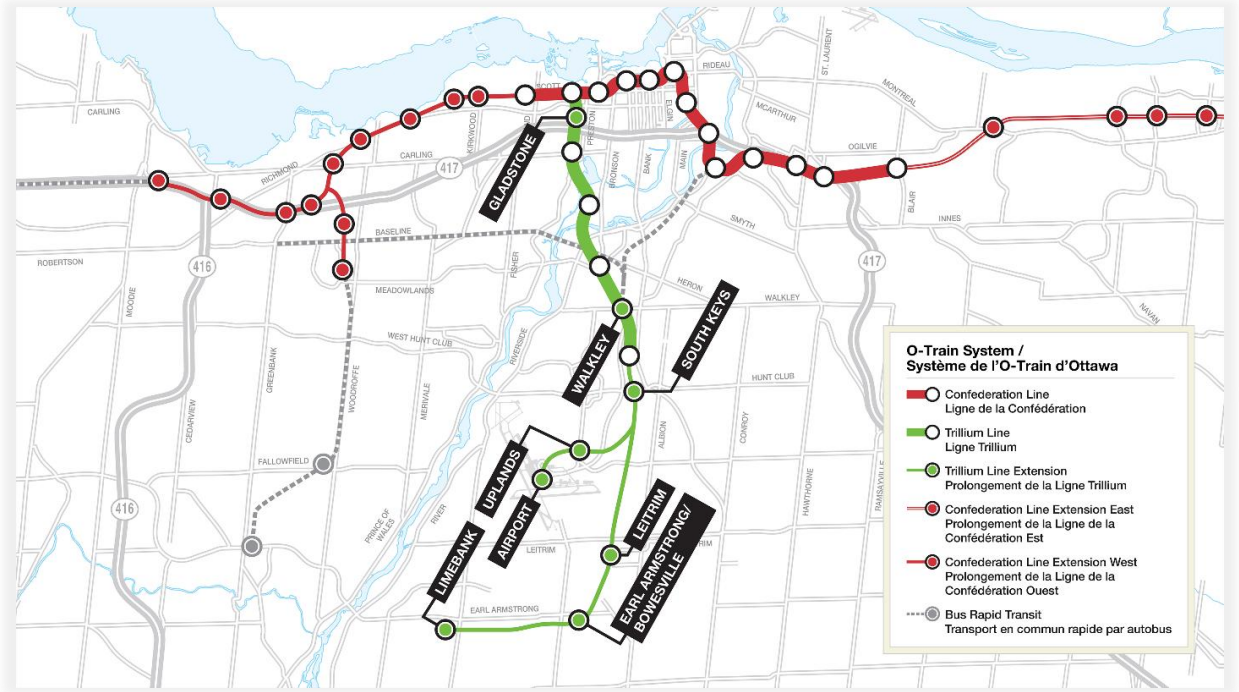
The alignment, station design and grade separation protects for the possibility of future conversion to twin-track electric LRT and will be built to accommodate future road widenings, such as the planned widening of both the Airport Parkway and Lester Road. The project can also accommodate the future Leitrim Road realignment.

The Trillium Line Extension Project will provide:

- New light rail transit connections for communities in Riverside South while bringing rail closer to Manotick, Findlay Creek, Greely, Osgoode;
- Connections to bus service in Barrhaven via the Vimy Memorial Bridge;
- The removal of approximately 110,000 bus trips annually from operating between Leitrim Road and Limebank Road;
- The removal of approximately 60,000 bus trips annually on the Airport Parkway;
- Improved service for the growing demand along existing route with new stations at Walkley and Gladstone; and
- Enhancements to the pathway network by providing a parallel multi-use pathway along the length of the extension, integrating into the new stations and connecting to adjacent communities and destinations.

Riverside South will be the first new suburban neighbourhood in Canada to have a core area, and the bulk of its development, take place with LRT service from day one. This will provide the viability for a much more advanced approach to integrated neighbourhood planning, allowing much greater densities, mixed-use buildings and pedestrian-oriented public realm to be developed from the onset as opposed to the traditional “over-time” evolution. This benefits both the landowners who are developing this community (allowing them to differentiate their residential offerings on the basis of LRT service and walkability) and the City (through making highly efficient use of urban lands as a result).

Figure 4: Trillium Line Extension Project



Confederation Line East and West (EWC)

Confederation Line East

The extension will run in the median of OR 174 (east of Blair Road) to contain costs, minimize community impacts and land requirements, and provide excellent connectivity to surrounding communities by offering stations that are equidistant to neighbourhoods on either side of the highway.

Overall, the alignment will be north of OR 174 as it leaves Blair Station, passing under the Blair Road interchange on the existing Transitway. The alignment will cross over to the median on a new structure between Blair Road and Montreal Road. The alignment will remain in the median of OR 174 from this location all the way to Trim Road, through the NCC Greenbelt.

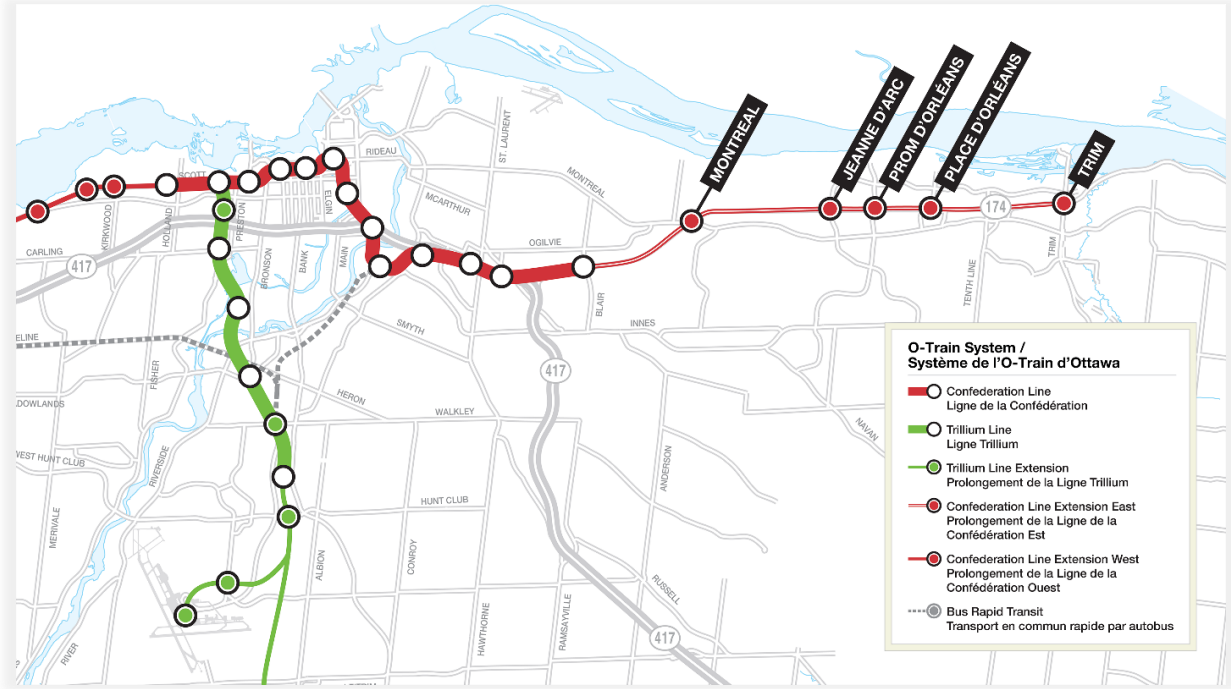
The dual LRT tracks will offer stops at five new stations: Montreal Road, Jeanne d'Arc Boulevard, Orléans Boulevard, Place d'Orléans, and Trim Road. All of the stations will be in the median of the OR 174.

The extension will provide:

- Over 12 kilometres of new rail and 5 new stations;
- The removal of approximately 330,000 bus trips annually from operating on OR 174 between Montreal Road and Blair Road;
- Closer connections to light rail transit for the communities of Convent Glen, Queenswood Heights, Chapel Hill, Fallingbrook, Blackburn Hamlet, Beacon Hill and Cardinal Creek, bringing 95 per cent of area residents within five kilometres of rail;
- Direct access to upgraded transit for residents near major roads, such as Montreal Road, Jeanne d'Arc Boulevard and Orléans Boulevard; and,
- More direct access of transit service to major centres of employment, shopping and education such as Orléans Town Centre, Canotek Park, Taylor Creek Business Park, La Cité, Place d'Orléans Shopping Centre, Bob McQuarrie Recreation Complex, Petrie Island, and more.

Additionally, due to the alignment operating in the median of the OR 174, some work and improvements will be made to the road.

Figure 5: Confederation Line East Extension Project



Confederation Line West

Starting from Tunney's Pasture Station on the Stage 1 Confederation Line, the extension will continue west along the existing Transitway corridor to Westboro Station and Dominion Station. West of Dominion Station, it will emerge from the existing Transitway trench to run at grade along the Ottawa River and Sir John A. Macdonald Parkway until a point just east of Rochester Field where it will enter a tunnel below the existing greenspace and will cross under the Parkway. Remaining in the tunnel, the line will cross Richmond Road at a point near Cleary Avenue and will run under the Byron Linear Park where Cleary Station and New Orchard Station will be constructed as below grade, open air stations.

The tunnel will continue west under Byron Linear Park, adjacent to Richmond Road until just east of the Parkway crossing where it turns south and emerges from the tunnel just south of Richmond Road at the Pinecrest Creek Corridor. The alignment continues at grade until Lincoln Fields Station and then will cross under Carling Avenue and continue in the greenspace east of the existing Transitway. At this location, the line splits into two branches with one branch going west to Moodie Drive and the other branch going south to Baseline Station.

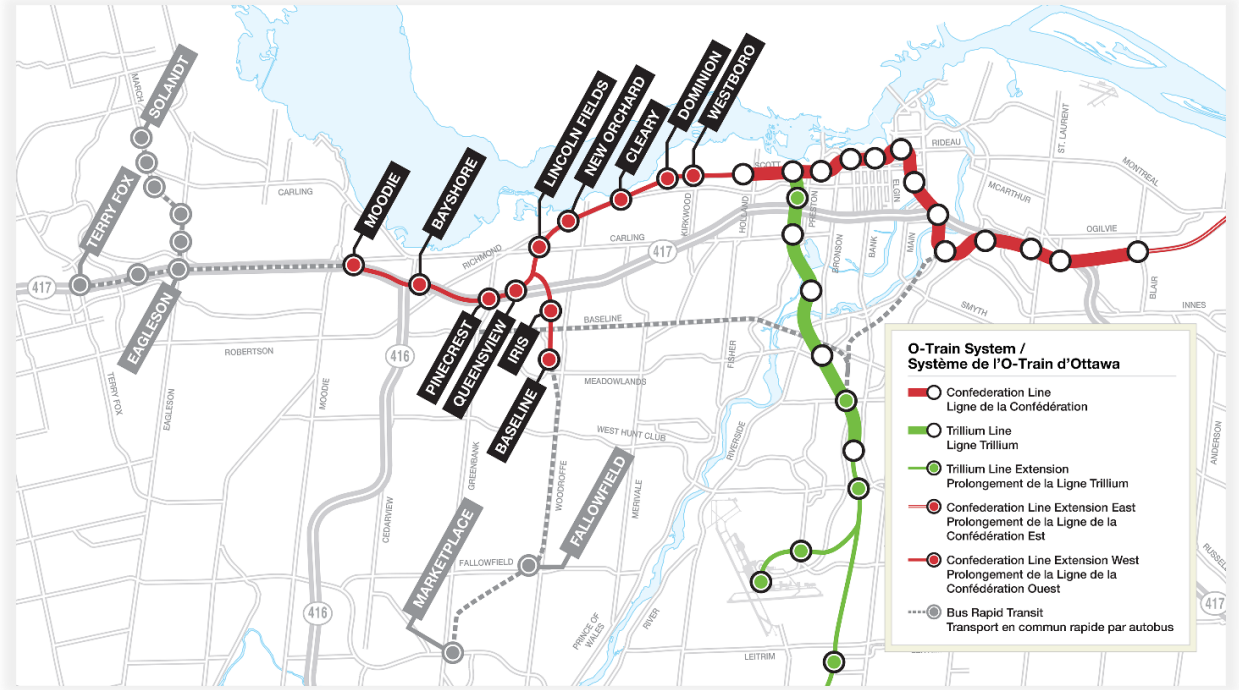
From the split going west, the line continues west under Connaught Avenue in a short tunnel and continues in a depressed "U" or trenched section through Queensview and Pinecrest stations. West of Pinecrest Station, the line continues at grade on the existing West Transitway alignment to Bayshore and Moodie stations. From Moodie Station, the design of alignment to the LMSF also protects for a revenue service connection to the future LRT line to Kanata, which is currently the subject of an approved Environmental Assessment.

From the split going south, the line follows the southwest Transitway alignment to Iris and Baseline stations.

The extension will provide:

a. 15 kilometres of new rail and 11 new stations;
b. The removal of approximately 450,000 bus trips annually from operating on the SJAM Parkway every day;
c. Direct connections to light rail transit for the communities of Hintonburg, Island Park, Westboro, Laurentian, Woodroffe/Lincoln Heights, White Haven-Queensview Terrace North, Bayshore, Iris, Centrepointe, and Lincoln Heights;
d. Protection of greenspace while increasing access to the Ottawa River pathway network, Westboro beach, Pinecrest Creek Corridor and the NCC's future Linear Waterfront Park;
e. Connections to important employment, shopping and education nodes, including Algonquin College, Bayshore Shopping Centre, Pinecrest Road, Lincoln Fields and Westboro; and,
f. Direct connection to Bus Rapid Transit (BRT) network.

Figure 6: Confederation Line West Extension Project



Improvements to Project

Limebank Road Extension

In July 2017, the City of Ottawa announced its intentions to pursue an improved Trillium Line alignment that moves the Bowesville Station, including the park and ride, to the southeast corner of Bowesville and Earl Armstrong roads. Among other benefits, this improvement provided an opportunity to extend this light rail corridor 3.4 kilometres farther west to Limebank Road with the existing LRT technology.

In May 2018, the City secured a $50 million investment from the Province. The Riverside South Development Corporation, a partnership between Urbandale Corporation and Richcraft, committed to an area-specific development charge, which supports an additional $30 million investment. With the commitment of $80 million, the City is able to proceed with the Limebank extension and the purchase of an additional Stadler vehicle.

This $30 million investment will be supported by an area-specific development charge for the extension to Limebank Road, to be formalized with the Riverside South Development Corporation (RSDC) by entering into a financing agreement. This agreement is to provide that any shortfall in area-specific development charge revenue to debt-finance the $30 million dollars for the period up to June 30, 2031, will be made up by RSDC, with RSDC to be reimbursed for the payment of such shortfalls thereafter.

The total amount of the area-specific development charge will be finalized with the adoption of the development charge by-laws in May 2019, and may be slightly higher due to servicing costs associated with the construction of the extension.

The station will be located west of Limebank Road, south of Earl Armstrong Road and east of Main Street (still to be built). The corridor between Limebank Station and Bowesville Station will be double-tracked and at grade (a rail-over-road overpass structure will be constructed over Bowesville Road south of Earl Armstrong Road and built to accommodate double-tracking). Crossing Limebank Road, the train will pass at grade underneath a new Limebank Road overpass.

Based on the ridership forecasts, cost analysis and the City's strategic priorities, the benefits of adding the Limebank Road extension are:

- Connectivity and community benefits - Residents in Riverside South and neighbouring communities will have a light rail link to the new Civic Hospital, Ottawa Airport, Carleton University and downtown Ottawa (via Bayview connection to Confederation Line);
- Environmental benefits - increased emission reductions due to incorporating 3.4 kilometres of additional LRT, which will reduce vehicle congestion and provide a public transit option for rural residents;
- Better planning through efficient land use – higher density and more compact land use in Riverside South, effective use of an existing rail corridor versus the need for additional or expanded roads through the Greenbelt and improved public transit connections to the terminus station; and,
- Transit adoption benefit – having the public transit built in tandem with the community build-out will likely increase transit adoption rates as the community grows, and supporting easy transit mobility to and from other neighbourhoods will increase the integration of Riverside South with the rest of the City.

Moodie Drive Extension

As noted, as part of planning for Stage 2 LRT, an opportunity was identified to extend the west corridor approximately 2.5 kilometres from the terminus (Bayshore Station) to Moodie Drive. This includes a terminus station located east of Moodie Drive at Corkstown Road, as well as a Light Maintenance and Storage Facility (LMSF) west of Moodie Drive, south of Corkstown Road, and north of Highway 417.

A connectivity study was completed for the area and extensive public consultation was undertaken to ensure nearby residents and stakeholders were involved in issues such as cycling and pedestrian connectivity.

The rationale for extending LRT beyond the previously identified terminus at Bayshore is to:

- Provide an LRT station in closer proximity to a large employment node (Department of National Defence complex);
- Support a LMSF for the operation of the Confederation Line extensions in the west with optimized operational and cost benefits; and,
- Opportunity to enhance BRT connections to Kanata and Bells Corners, as well as future LRT to Kanata.

Moodie Light Maintenance Storage Facility (LMSF)

Through Council approval of the *Stage 2 Implementation – Project Definition and Procurement Plan Report* (ACS2017-TSD-OTP-0001) in March 2017, staff were directed to initiate an EA process to advance the conversion from BRT to LRT from Bayshore Drive to Moodie Drive, and identify locations for both a station and potential LMSF. The following outlines the key objectives identified as part of this assignment:

- Identify a recommended plan for conversion of the West Transitway BRT extension to LRT technology, including implementation of the grade separation at Holly Acres Road and a BRT/LRT transfer station at Corkstown Road;
- Undertake a site selection review to determine a preferred site for an LMSF to support Confederation Line East and West LRT extensions; and,
- Undertake an EA process incorporating the above elements.

Based on the results, staff concluded Moodie Drive to be the preferable location for an LMSF and, as discussed previously, all environmental approvals and land requirements for the implementation of this facility have been achieved.

In order to place all of the required Moodie Station elements within available property, the plan includes a change in traffic patterns on Corkstown Road. This change will also address community concern related to cut-through traffic by making Corkstown Road a one-way westbound road for general traffic between the Crystal Beach community and Moodie Drive, with eastbound access maintained to the Moodie Station PPUDO (passenger pick-up and drop-off) from Moodie Drive. Subsequent to a future extension to Kanata, the Corkstown Road lane configuration would be re-evaluated.

Access to the Crystal Beach community is to be maintained via Carling Avenue and Holly Acres Road, while egress from the community will be unchanged. While the removal of the eastbound access from Moodie Drive may impact some residents' typical commutes, this change carries with it the benefit of Corkstown Road becoming a much less attractive cut-through route during the morning rush hour or during incidents on the highway, while at the same time providing the required transit capacity at the bus loop. The volume of transit vehicles through the Crystal Beach neighbourhood is not anticipated to increase as a result of this roadway configuration.

Station Descriptions

The station designs for Stage 2 LRT provide the same standards, design principles, and connectivity and mobility requirements as Stage 1. Stations will meet AODA standards and provide customers with audio announcements and visual screens, signage for wayfinding, and secure and covered waiting areas. Additionally, the stations will be designed to provide safety and security for customers, as well as comfort, continuity and connectivity.

As noted previously, the location of Cleary Station was shifted into the Byron Linear Park, similar to New Orchard Station, to further improve the design and alignment during the in-market period. More information on the benefits of this shift can be found in Appendix 5 of this report, which offers a detailed description of each station.

Integrated Transit-Oriented Development

As part of previous Stage 2 reports, staff committed to exploring potential transit-oriented development (TOD) specific to station-oriented development (SOD), around future LRT stations. The findings were then to be assessed to determine if there would be value integrating development opportunities into the Stage 2 procurement process.

Transit-oriented design calls for designs that are connected to transit, able to reduce vehicle parking, and provide clear pathways, entrances and exits to buildings that are linked or oriented towards a transit supportive approach.

N. Barry Lyons Consulting Limited was hired to perform a study based on other TOD experiences across North America, as well as to identify potential development opportunities and to assess market demand in Ottawa.

The study concluded that there were a number of factors influencing the ineffectiveness of municipal-led SODs, including transit providers not fully understanding the real estate market and prioritizing transit before planning. To address the priorities in a comprehensive manner an advisory panel was convened comprising of the City's Real Estate Unit, Planning Department and the Stage 2 LRT Design and Procurement team.

The study concluded there were opportunities for the City of Ottawa to proceed with SOD opportunities if "the opportunities are limited to clear, controllable, uncomplicated, marketable and politically supportable development sites." It identified five potential stations along the Stage 2 alignment with near-term SOD potential that could anchor significant development. Those stations were: Westboro, Baseline, Gladstone, Pinecrest and Cleary.

After further detailed review and analysis the advisory panel concluded that none of these sites provided an ideal development scenario or opportunity to pursue TOD. However, staff did determine that one site, at the intersection of Cleary Avenue and Richmond Road (747 Richmond Road), had some potential for a SOD.

However, due to the technical issues in the design, and means and method of a station construction, it was recommended that the timing of any potential overbuild be restricted to after the construction and commissioning of the LRT system. The decision to delay a SOD was primarily to avoid the complexities of having concurrent construction.

Moving forward, this site will be reviewed further by a recently convened interdepartmental working group that is mandated to explore and steward opportunities to ensure affordable and attainable housing in close proximity to current and future LRT and BRT stations. And, as has been previously committed by the City, any development of this site would need to remain aligned with the recently approved CDP for this area (ACS2018-PIE-EDP-0028).

Affordable Housing Opportunities

As part of a land-use review related to the Stage 2 LRT Project, staff developed a preliminary inventory of sites, adjacent or in close proximity to LRT stations that may provide an opportunity to increase the City's affordable housing stock.

Pursuant to this and Council direction received on May 9, 2018, staff created a working group to further explore and steward opportunities to ensure affordable and attainable housing in close proximity to both current and future LRT and BRT stations. This process identified publicly-owned sites that could leverage affordable housing opportunities, and these sites are in the process of being further assessed on the basis of the following timeframes as to when market and other considerations could likely trigger potential development:

- Short Term Opportunities (5-7 years);
- Medium Term Opportunities (7-15 years); and,
- Long Term Opportunities (+15 years).

The assessment of potential sites continues, with a report from the working group scheduled to come forward in Q2 2019.

Official Plan Amendment (OPA) - Proximity Guidelines and Development

The Development Zone of Influence provision, already established in the City's Official Plan for the Stage 1 Confederation Line (through OPA 130 in 2014), triggers a Proximity Study when development or redevelopment is proposed on land adjacent to the LRT corridor. The city initiated an Official Plan Amendment (OPA) to modify this existing policy to extend the Development Zone of Influence to encompass the entire O-Train network. This OPA was presented to Planning Committee on January 24, 2019 and approved at City Council on January 30, 2019 (ACS2019-PIE-EDP-0004).

This OPA modifies the language to refer more broadly to the O-Train network instead of the Confederation Line and changes Annex 17 to show the full extent of the O-Train network.

The limits of the proposed Development Zone of Influence were established through a combination of factors including the Light Rail Transit alignment depth, geotechnical conditions and sub-surface development, in the same manner as applied in the original amendment. This helps to recognize all development that potentially touches the entire O-Train network, giving more clarity and certainty to the development industry on the studies as well as the means and methods expected with respect to coordinating developments adjacent to, or potentially connecting to, the O-Train system.

Connectivity

Ensuring that key local pedestrian and cyclist networks are integrated into the Stage 2 LRT alignment, including stations, is a critical element of the project. The project will encourage active transportation through the creation of approximately 25 kilometres of multi-use pathways (MUPs), cycle-tracks and pedestrian bridges. This will add roughly $20 million of infrastructure to advance the City of Ottawa's pedestrian and cyclist network by providing critical connections, as well as fully accessible pathways to each Stage 2 LRT station.

These active mobility enhancements align with the policies of the Official Plan to provide multi-use pathways in, or adjacent to, rapid-transit corridors, where feasible. In addition, the extension of the pedestrian and cycling network furthers the goals of the Transportation Master Plan to improve the modal share of non-vehicular modes of transportation by better supporting active mobility commuting options.

As part of the Stage 2 LRT project stakeholder engagement activities, residents were invited to participate in connectivity studies to identify opportunities to facilitate new or improved pedestrian and cycling connections to the station, as well as links to the Citywide MUP system. Key connectivity opportunities and potential barriers within 1.5 kilometres of stations were identified by the City and presented to the public for their input.

For the Trillium Line Extension Project specifically, the project will add approximately eight kilometres of new cycling and pedestrian facilities to the network, as well as:

- A 60-metre pedestrian/cycling bridge crossing the Rideau River;
- Connection over the Airport Parkway to the EY Centre;
- A raised 80-metre pedestrian/cycling bridge over Hunt Club Road connecting to the existing MUP system (north-south);
- A 60-metre connection to Bayview Station at the Trinity development (Albert Street); and,
- A crossing at the closed High Road and railway intersection, to connect the natural areas that would be otherwise divided by the alignment.

The Confederation Line Extension Project will add approximately 17 kilometres of new cycling and pedestrian facilities to the network, including:

- Highway 417 overpass – connecting new Queensview Station to the south side of Baxter Road;
- New pedestrian bridge over Greens Creek on eastern alignment that will create new links to the Greenbelt pathways along the Sir George-Étienne Cartier Parkway;
- Two additional pedestrian underpasses under the Sir John A. Macdonald Parkway;
- Pedestrian and Cycling enhancements to the Moodie/417 Overpass;
- New pedestrian connections from Richmond Road to Bayshore Mall; and,
- Enhanced active mobility features through the Byron-Richmond Corridor.

Connectivity improvements and recommended connections that are beyond the scope of Stage 2 construction have also been captured through this consultative process and will be discussed within the context of the next Transportation Master Plan review. As these active mobility connections become operational, staff will also review to identify those that are critical for station access such that they can be added to the winter maintenance network in accordance with City policy.

Vehicles

Trillium Line

Stadler will supply seven high efficiency diesel FLIRT 3 models for the Trillium Line extension project, which are 80 metres in length (double the length and passenger capacity of the existing Alstom vehicles that currently operate on the line) and capable of being converted to electric in the future.

The FLIRT vehicles are rated “Tier 4 Final” for emission standards, which is considered the highest rating benchmark with respect to international environmental and performance measures for this type of vehicle.

The design has been configured to meet the requirements of OC Transpo, federal and regional regulations using tried and tested solutions, systems and components. The vehicles will be manufactured in Switzerland, before being transported, re-assembled and tested in Canada.

The vehicles have a crash absorption system for the protection of operators and passengers, and the light-weight design leads to low fuel costs. Reliability and performance are built into the design through four power units per vehicle, which are mounted in a central separate power car, allowing the passenger compartments to be efficiently insulated from noise and vibrations. The vehicles meet the highest current standard for diesel emission control, have a maximum speed of 130 km/h, and are designed to operate in temperatures ranging from 40^{o}C to -40^{o}C. Positive train control

with on-board diagnostics will provide OC Transpo controllers with live data and assure the safety of operations.

Each train will comprise four cars, and have a capacity of 420 passengers, 192 seated and 228 standing. Rapid boarding and disembarking will be provided, as every car has two double doors on each side – a total of 16 double doors per vehicle. Level boarding will be provided at all stations and doors, with a large low floor and space for wheelchairs and bicycles in every car between each set of double doors. Extremely powerful heating and air conditioning systems will provide for a comfortable ride in all conditions.

In addition, the Stadler vehicles are fully AODA *(Accessibility for Ontarians with Disabilities Act)* compliant. Stanchions and handholds will be available for the safety of all standing passengers, with full CCTV and modern passenger information systems.

As noted in the Business Case, the Stadler vehicles will provide reduced fuel consumption based on the newer diesel engines, and generate substantial environmental benefits as it will produce emission reductions by approximately 32 metric tonnes of NOX, as compared to the existing fleet over the concession period to 2048. These gases contribute to acid rain, deteriorate water quality, and contribute to climate change.

Figure 7: Stadler FLIRT Vehicle

Airport Link Vehicles

The City will retain the rest of the current fleet of Alstom Coradia LINT trains for use along the Airport Link. Additionally, two Alstom vehicles will be coupled to provide service with the Stadler vehicles on the main Trillium Line. They will be completely refurbished and maintained by TNEXT in order to ensure a reliable and pleasant customer experience. The Airport Link will operate as a shuttle with single-vehicle trains to Uplands Station and Airport Station on the same 12-minute frequency as the Trillium Line.

Confederation Line Vehicles

As mentioned, the Confederation Line extensions will continue to be served by environmentally friendly Alstom Citadis Spirit trains able to accommodate up to 600 passengers on two, coupled vehicles, with zero emissions and a regenerative braking system that provides power back to other trains on the Confederation Line. Once Stage 2 LRT is complete, passengers travelling on the electric powered Confederation Line will be able to travel emission-free from Trim Road in the east to Moodie Drive and Algonquin College in the west.

The vehicle is 49 metres long to provide end-to-end visibility and line of sight within the vehicle interior, which enhances passenger safety and accessibility. The vehicle has 120 seats with capacity for another 180 standing, bringing total vehicle capacity to 300 (based on specified passenger comfort level of 3.3 people per m^2). Each vehicle includes four designated wheelchair areas for accessibility. The system will operate with two vehicles coupled together to form the train.

The Citadis is an exceptionally energy efficient vehicle and is 95 per cent recyclable. The vehicle's efficiency contributed to the RTG systems energy efficiency that uses half the energy of the reference design produced by the City's preliminary design effort. This is due, in large part, to features such as its regenerative braking system, single-stage gearbox, low consumption LED interior lighting and a 98 per cent efficient electric drive system. Furthermore, the vehicle is designed to meet low noise performance standards both inside and outside of the train.

The Citadis vehicle is one of the quietest, most accessible vehicles in the world. The vehicle interior is designed with a 100 per cent low-floor passenger area and seating arrangement to provide full accessibility, using both ADA (*Americans with Disabilities Act*) and AODA as a best practice reference to meet or exceed the relevant accessibility standards. The vehicle is equipped with seven dual leaf, 1,450-millimetre-wide doors per side to optimize passenger accessibility and reduce the time it takes for customers to enter/exit the vehicle.

Accessibility elements for both vehicle models will include:

- Designated multipurpose areas for customers using wheelchairs and other mobility devices;
- 100 per cent low-floor passenger area and seating arrangement;
- Floors will be slip-resistant and low-glare, and high-visibility yellow grab bars will be easily reached from all positions inside the train;
- Signs will include the International Symbol of Accessibility, will consider colour contrast and large print and will be displayed on the exterior of each vehicle;
- The doors use auditory and visual warning signals to alert passengers when doors are closing;
- Accessible signage that indicates which seats are priority seats for persons with disabilities;

- All passengers have access to push buttons to request assistance or to communicate with onboard staff in an emergency; and,
- The next stop announcement system onboard trains will provide audible and visual stop announcements in both official languages.

Bundled Projects

The Stage 2 LRT Office, in consultation with City Branches, have identified a number of opportunities to bundle City projects into the scope of LRT. This bundling creates efficiencies and, in some cases, speeds up the timeline with which these projects would have otherwise been completed.

For the most part, these are planned infrastructure renewal or rehabilitation works ancillary and/or adjacent to the Stage 2 LRT Project that benefit from being bundled into the project through design and construction efficiencies and avoiding schedule risks with the use of a single contractor. In the Stage 1 Confederation Line Project, these projects were undertaken as Cash Allowance Projects. This meant that the City handed the projects over to RTG as fully designed projects with the associated budget with all design risk remaining with the City. A lesson learned from the Confederation Line Project is that additional value could be achieved by bundling these ancillary projects during the procurement period so that they benefit from the full risk transfer and cost and schedule certainty of the main P3 contract.

To this end, staff received previous direction from Council to undertake a detailed review of any City, Provincial or Federal projects (subject to agreement of the senior government partners) that are planned for implementation in the Stage 2 LRT Project construction timeframe and to bundle projects to be included in each Stage 2 project as appropriate.

It is important to recognize that for the most part, these projects have not increased the budget for Stage 2 LRT project money has been identified from other City budgets or through third-party financial agreements to pay for the work. Where the Stage 2 LRT project is contributing are in circumstances where the project mutually benefits from the bundled project; for example, the Ellwood Diamond grade separation which is to be cost-shared with VIA Rail.

The following tables list the bundled projects that have been included within the overall capital scope of both Trillium Line and the Confederation Line Extension Projects as well as the total sponsor contribution. The contribution amounts were based on estimates performed by the Owner’s Engineers consistent with all other project estimates performed as part of the City’s shadow bid exercise.

Table 2: Bundled Projects List -- Trillium Line Extension Project

Project	Project
Ellwood Diamond Grade Separation	Trinity Ped Bridge and Station (Bayview)
Rideau River Ped Bridge	Power Pack and Transmission Overhaul
Dow's Lake Tunnel Rehab	Year 8 Alstom Vehicle Overhaul
Rideau River TL Bridge Rehab	Existing Trillium Line Station Enhancements
Conduits (Trillium Line)	Trillium Line Signal Upgrades
Carleton Tunnel	Sawmill Creek and O-Train Culvert
Trillium Line Bridge over Sawmill Creek	
	TOTAL = $67,000,000

Table 3: Bundled Projects List -- Confederation Line Extension Project

Project	Project
Montreal Road Bridge	OR 174 Concrete Removal
Jeanne d'Arc/174 Bridge repairs	OR 174 / Greens Creek culvert replacement
Trim Park and Ride expansion	OR 174 Intelligent Transportation Systems
West Transitway North and South Rock Wall	City Traffic Operations – Fibre-optic Breakout Points
Storm/Sanitary Sewer Upgrades Pinecrest Creek	Golden Rod Bridge
Storm/Sanitary Sewer Upgrades for Richmond Complete Streets	Baseline Station Surface Improvements
OR 174 Shefford Road Watermain Crossing	Woodroffe SWP (Design, EA, Implementation)
OR 174 Non-OLRT Culverts	Bridge enhancements at Moodie
OR 174 Integrated OLRT Culverts	Bus layups on Jeanne d'Arc
OR 174 Sound Barriers	Algonquin College Ped Bridge
Pedestrian and/or Cycling Projects Outside LRT Scope	
	TOTAL = $107,000,000

In addition to the bundled projects, the City will be undertaking road construction work outside the scope of Stage 2 LRT, but within the proximity and timeframe of the LRT construction. For example, work to improve traffic flows through the Leitrim Avenue/Albion Road intersection and work along Bronson Avenue (at Raven Road) will be undertaken to facilitate the Trillium Line Extension Project detour. Both projects will be completed before the Trillium Line shutdown.

These are works that also have an external funding source from the Stage 2 LRT program and will be coordinated by the Rail Construction Program as their delivery is not tied to TNEXT's construction schedule.

Construction Schedule

P3 projects function best when the implementation schedule is left to the private sector to optimize without setting financial incentives or disincentives for schedule targets. These companies use sophisticated modelling tools to calibrate the cost of labour, inflation, materials, financing and risk in order to submit a schedule that is most cost effective and achievable.

Along with cost, schedule is an effective tool for the private sector partner to manage their risks. By committing to a fixed schedule, as with the Stage 1 project, schedule overruns result in significant additional costs both in terms of unanticipated labour expense but also increased cost of their private financing. By considering their risks, and with the benefit of the experiences from recent P3 project implementations around the world, both bidders have submitted a schedule that balances the desire to have the project complete as soon as possible against cost and risk.

In March 2017, staff provided initial target estimates for completion timelines with respect to Confederation Line East, Confederation Line West and the Trillium Line extensions, which were based on the original project scope and procurement schedule, and assumed contract award in mid 2018.

As directed, staff designed the procurements such that each extension would be completed between six months and a year from each other. Staggering the Trillium Line and Confederation Line extensions will allow OC Transpo to ensure an orderly and efficient rollout of the extensions into revenue service.

As detailed in the Procurement Schedule section of this report, the significant scope which was added to the project prolonged the in-market period and necessitated a later contract award date. This, in turn, impacted the overall construction schedules that were submitted by TNEXT (Trillium Line extension) and EWC (Confederation Line extension).

Table 4 below compares the 2017 estimate to the bid and committed schedule dates. All of the dates have been extended both as a result of the eight-month difference between anticipated contract award estimated versus actuals, as well as the additional scope and other considerations noted above.

Table 4: 2017 Schedule Estimate vs. Bid

2017 Schedule vs Bid Schedule	2018	2019	2020	2021	2022	2023	2024	2025
Confederation East 2017 Estimate								
East West Connectors Date								
Confederation West 2017 Estimate								
East West Connectors Date								
Trillium Extension 2017 Estimate								
TransitNEXT Date								
	Contract Award Date							
	Construction Completion							

Table 5: Updated Schedule

Activity	Timeline
Trillium Line Construction Start	Q2/Q3 2019
Confederation Line East & West Construction Start	Q2/Q3 2019
Trillium Line Shutdown Period	Q2 2020
Trillium Line Construction Completion	2022
Confederation Line East Construction Completion	2024
Confederation Line West Construction Completion	2025

For details on the approaches both TNEXT and EWC have planned to facilitate the implementation of each of their extension projects, please see the Construction Methodology Appendix 6 attached to this report.

B. Stage 2 LRT Budget, Funding, Schedule and Risk Transfer

Stage 2 Estimate Evolution

Along with the 2013 TMP's vision for Stage 2, a budget was set at approximately $2.5 billion ($2013). With escalation to time of construction, the same budget was $3 billion. In 2013, the total scope of 30 kilometres of rail and 19 stations along with the associated project costs estimates were set out in the following table.

Table 6: 2013 Capital Costs (TMP)

Summary of Major Capital Items ($2013 millions)	Cost	Senior Government Contribution
Light Rail Transit (LRT)		
O-Train extension	$99	✓
LRT – Tunney's Pasture to Baseline	$980	✓
LRT – Lincoln Fields to Bayshore	$396	✓
Orléans LRT	$500	✓
Total Infrastructure	**$1,975**	
Vehicles	$453	✓
Storage and Facility	$50	
Total LRT Including Vehicles	**$2,478**	

In comparison to more recent cost estimates developed through the Stage 2 procurement process, the budgets for Confederation Line East and West at $1.876 million and the estimate for the $453 million for vehicle fleet expansion were confirmed. However, the 2013 TMP budget estimates did not properly address maintenance and storage requirements, as well as accommodate the capital elements and improvements required to ensure overall reliability and good system integration for the expanded Trillium Line. Based on the high-level design available at the time and significant scope increases during the procurement phase, these budgets of $50 million and $100 million respectively, have been shown to be inadequate.

The City's ultimate network includes an LRT extension from Place d'Orléans to Trim Road, as well as a Trillium Line link to the Ottawa Macdonald–Cartier International Airport. Council chose to include these additions within the Stage 2 program to take advantage of design, construction and schedule efficiency available by undertaking these extensions within Stage 2. Council, however, directed that this additional scope would only go forward if additional funding support could be secured such that federal and provincial governments cost-shared the additional scope. The potential cost of this additional scope was budgeted on the high-level existing information contained in the 2013 Transportation Master Plan. The total Stage 2 LRT program was then to be set at $3.3 billion.

Table 7: 2013 Capital Costs (Updated)

Element	$2013	$'s Escalated to Time of Spend
Stage 2	2 500 000 000	3 000 000 000
Extension to Trim	135 000 000	160 000 000
Extension to Airport	130 000 000	155 000 000
Total	2 765 000 000	3 315 000 000

Federal and provincial funding commitments for both Trim and the Airport Link extensions were subsequently confirmed. The Province of Ontario announced its support on June 3, 2016. The Government of Canada then announced its support on June 16, 2017.

Leading up to the in-market period for the Stage 2 procurement, Staff anticipated the potential for the procurement to provide up to 20 per cent in cost compression through design innovation and value engineering. This type of cost reduction has been achieved by other P3 projects undertaken since 2008. This aligned with reductions from the budgeted estimate that had been previously achieved in Stage 1 Confederation Line and other more recent procurements such as the ION Rapid Transit Project in Waterloo and the Metrolinx Eglinton Cross-town LRT project in Toronto.

With an overall program of $3.3 billion, and based on these recent market results, staff calibrated the procurement such that the City could benefit from similar cost-compression allowing up to $330 million, or 10 per cent of additional scope to be brought into the Stage 2 program without adjusting the construction target price.

Scope Change Enhancements

The biggest enhancement that staff hope to achieve through cost-compression is the extension to Moodie along with the LMSF. Inserting what is estimated at $235 million in additional scope into the project represents good value, as it not only brings Confederation Line two kilometres closer to Kanata, but it also builds the first phase to support storage and maintenance requirements for Stage 3, thereby reducing the cost for the City's next phase of LRT.

A summary of the total complement of enhancements brought on the Stage 2 Program is valued at $311 million, and includes:

- Extension to Moodie, including Moodie Station, Moodie LMSF;
- Place d'Orléans Station Bridge and Champlain Street entrance;
- Additional Washrooms (Lincoln Fields, Place d'Orléans);
- Additional escalators (11);
- South Keys north tunnel;
- Detour facilities (including Highway 417 ramp work);
- Gladstone Plaza expansion;
- Double tracking south of Leitrim to Limebank;
- Fully independent alignment for Airport Link;
- Double engines for Stadler Vehicles; and,
- OR 174 Stormwater improvements.

Because of the sheer scale of Stage 2 it is a project that will need to perform well for generations, not just day-one. So, the City ensured the Stadler vehicle performance was more reliable and more akin to the Alstom vehicles that would also serve Trillium Line. The Project adds customer facilities to ensure convenient, comfortable and efficient passenger flows as ridership grows. Infrastructure enhancements have been incorporated to ensure long-term performance, and stations in areas that are rapidly intensifying, like Gladstone, will be built so that they can accommodate integration.

As detailed above, these enhancements carry an estimated value of $311 million worth of scope into the procurement process, with the majority of improvements delivered through the Confederation Line Extension Project. In addition, the City continues to evaluate bundle projects that came with additional funding for inclusion into the Stage 2 program. While previously discussed, these major additions of both funded and unfunded are summarized below.

Scope Additions Trillium Line

- New Walkley Maintenance and Storage Facility;
- Upgrades to existing 8-kilometre system;
- Takeover of existing alignment assets to 2048;
- 7 Stadler Vehicles;
- Fully independent alignment to Airport from South Keys;
- 3.4-kilometre extension to Limebank Road (with $80 million in additional funding);
- Bundled Projects (with $67 million in additional funding); and,
- Ellwood Diamond Grade Separation.

Scope Additions Confederation Line

- Bayshore to Moodie Extension;
- Moodie LMSF;
- Bundled Projects (with $107 million in additional funding);
- Additional Washrooms; and,
- Additional Escalators and Elevators.

With these scope adjustments, and trying to maximize the potential for cost-compression, the following table summarizes the project estimates and adjustments that were made to the construction budgets for both the Trillium Line and Confederation Line Extension Projects since the March 2017 Stage 2 report to the closed final release of the RFP.

Table 8: Stage 2 2017 Capital Budgets

	March 2017 Estimates
Trillium Line Extension (Capital)	$488M
Confederation Line Extensions (Capital)	$1,800M

Trillium and Confederation Line Budget Process

As noted in the table above, with City costs also removed, the construction capital target budget for the Trillium Line Extension Project was set in 2017 at $488 million. As a design build finance and maintain procurement, the Trillium Line Extension Project had both a capital and an aggregate (capital and maintenance) shadow bid, and corresponding budgets. These estimates were used to set distinct target budgets for the project at the time of the RFP release. As both the capital and maintenance budgets are carried in the City's long-term transit affordability model, bidders were permitted to optimize the balance between the capital dollars required to build the system and long-term cost of maintenance and lifecycle rehabilitation to produce the lowest overall cost.

The City set the budgets on the assumption that the bidders would choose to keep in place much of the existing Trillium Line infrastructure and slowly replace it causing additional lifecycle and maintenance costs over the concession period to 2048, but reducing the upfront capital. TNEXT, instead, used the flexibility afforded to them in the procurement to pull forward $236 million of maintenance costs as capital in order to undertake a much more comprehensive upgrade of the existing infrastructure that will create a seamless and integrated system on opening day.

While this has increased the capital costs of the project it is more than offset by the maintenance savings as TNEXT's total bid price was still $120 million below the

aggregate (capital and maintenance) budget even with the $236 million shift of maintenance budget to capital.

MOU Pricing

Following approval the March 2017 report, the City entered into a MOU with RTG for the maintenance of the full Confederation Line system. This procurement process allowed the City to structure the Confederation Line Extension Project RFQ/RFP in such a way as to keep a single maintainer for Confederation Line as well as remove many potential interface challenges. It also created the conditions for a more competitive bid process. Extensive market soundings showed that allowing RTG to bid on the design and build portion of the project would effectively have eliminated any completive tension allowing an unconstrained ability for the incumbent to dictate its price for the works.

The March 2017 report set out the areas that RTG could price based on metrics moored to pricing set under competitive tension during 2012 Confederation Line Project procurement. At the same time, and as a condition of the agreement, RTG agreed to forego bidding on the Confederation Line Extension Project. Instead RTG participated as a partner to support the City in ensuring design and construction quality for the expanded capital. In these ways, RTG is supporting the City in holding a successful Design Build short-term Finance (DBf) procurement with technical expertise, as well as providing design reviews. RTG will also assist with construction oversight services to ensure the quality of the build for infrastructure it will ultimately inherit and maintain over the long-term.

The MOU between the City and RTG provides for a fixed-price for the project components and services that will be delivered by RTG. This scope includes the 38 additional Alstom Citadis light rail vehicles (LRVs) required for the Confederation Line extensions and the expanded Belfast Yard MSF. It also includes the integration of on-board train control and communications equipment integrating the new trains into a seamless signalling system. Once the Stage 2 Confederation Line extensions are complete, RTG will assume responsibility for maintenance and lifecycle of the fully constructed line, as well as the expanded fleet of LRVs. With RTG taking on this expanded maintenance scope, the City will keep a single point of accountability with RTG retaining all maintenance and service availability risks.

The City's Owner's Engineer team developed independent estimates of cost for the scope of work for each of the items in the agreement with RTG and was able to validate the value of the covered scope. This was based on the original Confederation Line pricing, but also on extracted values for the inherent efficiencies known to exist for RTG. With this analysis in hand, both the vehicle and maintenance pricing that resulted through negotiations with RTG were confirmed to provide good value to the City. Each additional vehicle was priced $1 million below the 2012 price.

The lower per kilometre vehicle maintenance price along with a lower infrastructure maintenance price, achieved significant savings for the City over the life of the maintenance concession period. The following summarizes the reductions that have

produced these savings as they compare to the 2012 Confederation Line Project Agreement.

Table 9: Savings Through RTG MOU (Part 1)

RTG MOU Scope	Savings from the Bid Price to the final Negotiated Price
Per Vehicle	$1 million reduction
Per km Vehicle Maintenance	7% reduction ($2.45 to $2.27)
Per km Infrastructure Maintenance	27% reduction ($1.40M to $1.02M)

If the maintenance pricing that the City secured through the Stage 1 Confederation Line PA had been extended over the expansion system to include both Stage 1 and Stage 2, the costs would have been more than $700 million higher. Table 10 sets out the reduction in variable cost for total vehicle kilometres travelled as a result of harnessing the efficiencies provided by extending the RTG scope.

Table 10: Savings Through RTG MOU (Part 2)

	Variable Cost	Fixed Cost	Total
Stage 1 Pricing	$ 1,143,320,457	$ 2,281,660,765	$ 3,424,981,222
MOU Pricing	$ 1,059,321,403	$ 1,662,352,843	$ 2,721,674,246
		Efficiency Savings	**$ 703,306,976**

Confederation Line Budget

The Confederation Line Extension Project had a 2017 contract budget estimate at $2,044.5 million which was adjusted through the in-market period to accommodate the aforementioned additional scope. The subsequent removal of the Highway 417 widening scope reduced the overall budget to $1,800 million, as noted in Table 8. The inclusion of the various bundled project initiatives and associated funding also affected the final target budget. With these adjustments, the final Confederation Line Extension Project construction budget target was estimated at $1,980 million.

In the case of the Confederation Line Extension Project procurement, no bid team was able to achieve the budget target. The EWC bid provided an all-in, fixed price bid of $2,571 million for construction costs—several hundreds of millions of dollars less than its nearest competitor.

Market Pricing Sensitivity

More recent LRT projects under tender in Canada have also experienced a significant market shift that have resulted in construction costs coming in higher than early estimates. Some of the possible factors driving this change in market pricing include:

- **LRT market trends**. Several major LRT projects under construction across Canada, including Stage 1 Confederation Line, are experiencing significant issues. Among the troubled LRT projects are Waterloo ION, Eglinton Crosstown, and Edmonton LRT, all of which are struggling with challenges that were unanticipated but now must be faced by the P3 bidder within a fixed-price. The marketplace is responding with more conservative pricing and schedules overall. On one level this is to be expected and is a good thing—the market is responding as markets should. However, it does shift the basis on which the original project estimates were set.

- **Access to labour and specialized service providers**. Given increased level of market activity for civil construction, particularly rail projects, increased demand for resources and skilled trades leads to shortages and pressures on total labour costs. Similarly, demand for common contractors across LRT projects across Canada, and specifically in Ontario, could be further attributing to the labour cost pressure. There are also a large number of procurements awarded, expected or in market competing for resources such as Metrolinx's Regional Express Rail (RER), Finch West LRT, Hurontario LRT and Hamilton LRT and CDPQ's Infra Réseau Électrique Métropolitain (REM) in Montreal. Significant new projects in Toronto including the Scarborough Subway, York-Yonge Subway and Downtown Relief Line projects are expected by the market. All of these projects are creating capacity issues and driving up costs.

- **Cost of materials.** Uncertainty regarding vital commodities driven by international trade and tariff issues is creating upward pressure on contingencies. Increased demand for materials, such as steel, combined with changing economic conditions and recent tariffs is showing up in bid pricing when compared to previous estimates and unit costing.

Another related factor is that general market interest may be recently reduced due to changes in the market in view of the risk of civil projects, as projects move to completion and market fatigue/competition with other significant more recent procurements such as Metrolinx's Regional Express Rail (RER) and CDPQ's Infra Réseau Électrique Métropolitain (REM) in Montreal, which was recently awarded.

While the Stage 2 LRT procurement has been forced to adjust to the cost increases experienced during the in-market period, given the increased scoped enhancements, the reach and the improved overall system reliability, the overall Stage 2 program represents good value for money for the City of Ottawa and its residents.

Contribution Agreements

The Province of Ontario and the Government of Canada, respectively, made formal commitments of ($1,208M and 1,158M) in capital funding to support the construction of Ottawa's Stage 2 light rail transit project.

As part of the funding model, the City is required to enter into a Contribution Agreement with both the Federal Government and Province. These agreements outline and define eligible costs, payment structures and mechanisms, and construction timelines. The agreements necessitate adherence to federal and provincial requirements with respect to environmental assessments and aboriginal consultation. The City has met these requirements and, as outlined in this report, will continue to work with aboriginal stakeholders throughout the project.

With the actual capital cost now known, the City of Ottawa will require approximately $1.2 billion in additional capital cost, including Stage 1 and Stage 2, above its original one-third share. This is a basic tenant of cost-shared projects where the province and federal contributions are set early in the process and are then fixed.

C. Project Agreements

Role of the Project Agreement

The Project Agreements (PA) for both Confederation Line and Trillium Line provide the framework to create and ensure value for the City, clearly define each project's risk profile, and outline design requirements, utilities and geotechnical obligations, construction timelines, incentives, maintenance terms (for Trillium Line Extension Project only) and systems integration.

The City's approach to contract management will be to ensure strict PA compliance throughout the lifespan of the projects. While similar in many ways, there are important distinctions between the two PAs as the projects are unique and driven by the procurement structure – a DBFM for Trillium Line, a DBf for Confederation Line.

Risk Profile

Based on Lessons Learned from the Stage 1 Confederation Line Project, along with the need to create a unique procurement model for two separate projects, the O-Train Planning Office developed a procurement that would produce strong risk protection for taxpayers.

One of the principle goals of the P3 procurement is to ensure a risk transfer regime that results in best value to the City as sponsor. In general, risks are assigned to the party best positioned to manage, understand and accurately quantify them.

These risk profiles are clearly identified in the Stage 2 Project Agreements with concise language to distinguish the party responsible for a specific area of risk. There are clear and concise contractual obligations in place to address responsibilities with respect to scheduling and completion dates, financial payments, force majeure (unforeseeable and/or uncontrollable circumstances that could impact cost and schedule), and maintenance of the system and related infrastructure.

The following sections outline key elements of the risk profiles related to both the Trillium Line and Confederation Line Extension Project Agreements.

Utilities

Early on in the procurement process, the City determined that the Proponents could not efficiently take on the full scope of risk related to utilities. As a result, the City structured a regime whereby it would hold risk related to utility relocations and conflicts and mitigate these risks through the use of a Utility Baseline Report (UBR).

Similar to the Stage 1 Confederation Line project, the Stage 2 Project Agreements (PAs) for Confederation Line and Trillium Line also employ a Cash Allowance model for work that is self-performed by third-party utility companies. While these consistencies with the Stage 1 Confederation Line PA form the basis for the City's approach to Stage 2, there are some departures from Stage 1 as they relate to third-party utility performance and the reliability of utility record information within the Stage 2 PAs.

Both TNEXT and EWC are dependent on third-party utilities for work that must be self-performed by the respective utilities. The Stage 1 Project is an early example of a linear construction project with a design-build delivery model, and schedule risk for self-performed utility work was largely borne by RTG. Through time, and the execution of more projects under this or similar DBMF delivery models in Ontario and the rest of Canada, market conditions have evolved to where project proponents are not prepared to fully accept an unlimited schedule risk of this nature. Therefore, it is becoming common practice to institute a UBR process, which transfers some schedule risk and cost-sharing to the City as the project sponsor.

In specific terms, the Stage 2 UBR process includes 32 utility projects supporting Stage 2 initiatives for completion by Enbridge, Bell, Rogers, Hydro Ottawa Ltd. and others. Upset durations for these projects have been negotiated by the City with each of the respective utilities. If these timelines are exceeded in a manner that results in a material impact to a private sector partner's project schedule, as the case may be, TNEXT or EWC may be entitled to schedule relief and compensation (on a cost-sharing basis depending on the duration of the delay) for the resulting delay.

In addition, a mislocated and unknown utilities regime was also incorporated into the Stage 2 PAs to ensure the projects were more marketable, and to address schedule and cost risk costs the Proponents may otherwise carry within their respective bids. Conflicts with existing mislocated and unknown buried utilities can have a significant bearing on projects in an urban setting. Often, it is not the actual cost for protecting and/or relocating the impacted utility, but rather the delay for executing the unanticipated work, that can have the greatest financial impact.
As utilities provide critical services for residents and commercial properties, it can take significant planning, notice and contingencies to complete utility work while maintaining acceptable levels of service. With the City's private sector partners not entirely in control of these variables, project proponents perceive this as a great risk exposure that would otherwise come with considerable additional project costs in the form of risk pricing. As such, PAs provide TNEXT or EWC, as the case may be, schedule relief and compensation if (i) unknown utilities are discovered or (ii) utilities disclosed in the City's subsurface utility engineering reports are ultimately found to be located outside certain parameters from where they were indicated to be in such reports.

Geotechnical

Each of the Trillium Line and Confederation Line Extension Projects has the Proponent assume all geotechnical risk unless:

- There is an error on the Geotechnical Data Reports (Trillium) / any of the information in the Geotechnical Reliant Reports (Confederation) is incorrect;
- Geotechnical Reports are, in the City's actual knowledge, incorrect; or,
- The City has other information that demonstrates the Geotechnical Reports are incorrect, in which case, if validated, the private sector partner may be entitled to a Variation.

Subject to the foregoing, as detailed within this section, it is important to note that TNEXT and EWC hold the risks associated with geotechnical work.

The geology of the Ottawa region where the Stage 2 alignment runs is complex. The Champlain Sea clay deposits, known as Leda clay, that are found throughout the city of Ottawa, present a challenge due to potential long-term ground settlement, instability due to earthquake events, and sensitivity to vibrations. These ground movements may generate significant forces on deep foundations such as at the proposed Montreal Road interchange structures and retaining walls, and those for the culvert at Greens Creek.

The Confederation Line West alignment traverses sensitive clays, sands and silts, glacial tills, and bedrock. Relatively long structures, such as tunnels, may experience differential settlement due to the variety of materials below invert level. Similarly, the Trillium Line alignment, including the Airport Link and Limebank Road extensions, run on and through varying soil conditions. Relatively deep sensitive clays were also encountered generally along the Limebank Road extension.

Geotechnical data, in the form of Geotechnical and Hydrogeological Data Reports (GDRs and HDRs), were provided to Proponents to support their bid package preparation, preliminary design, and advanced permitting processes such as Permits to Take Water (PTTW) for construction purposes. The geotechnical investigations, completed in accordance with industry best practices recommended by Infrastructure Ontario, included a sufficient number of boreholes and monitoring wells along the alignment, including field and laboratory testing. These investigations and corresponding data sets are necessary to guide the Reference Concept Design (RCD) and Proponents' preliminary designs. They help reduce the risks related to the Proponents' contingency budget for unknown or unforeseeable subsurface and groundwater conditions.

The Project Specific Output Specifications (PSOS) sections of the PA include requirements related to the design and construction of foundations, temporary and permanent cut and cover slopes and structures, earthworks, instrumentation and monitoring, groundwater control, seismic design, and investigations and testing prior to construction. The following are examples of PSOS requirements that TNEXT and EWC must follow to limit risks to the City:

- Follow applicable codes, standards, laws and criteria, referencing the more stringent in case of conflict;
- Retain the services of qualified professional engineering consultants with local experience and knowledge of Leda clay;
- Satisfy all necessary third-party requirements (NCC, gas, utilities, etc.);
- Mitigate against both short- and long-term adverse impacts due to the swelling potential, stress relief associated degradation of shale;
- Protect existing adjacent structures, including related instrumentation and provide alert levels;
- With the City's approval, decommission and dispose of instrumentations, existing and installed, documented or not documented in the background information and obtain the City permission prior to decommissioning; and,
- Not permitting the lowering of groundwater levels in the vicinity of Cleary Station due to the presence of an adjacent structure supported on clay and limiting water drawdown in other areas where sensitive clay deposits are or may be present.

Confederation Line - System Integration

The Confederation Line Extension Project introduced unique and significant areas of risk profile complexity due to the City's goal to have both the Confederation Line east and west extensions integrate seamlessly with the Stage 1 Confederation Line Project. To achieve this, the City has required EWC to carry the risk for System Integration and the completion of a successful Interface Agreement with RTG. With respect to System Integration, EWC is responsible for design and integration of the communications and train control systems with the Stage 1 system. In addition, EWC is responsible for interfacing with RTG during the warranty period in accordance with the Interface Agreement described in the section below.

Confederation Line Extension Project, Communications Based Train Control (CBTC) — Thales Signalling Solution

As noted, expanding the Stage 1 Confederation Line Communications Based Train Control (CBTC) system to the Stage 2 Confederation Line, while ensuring that EWC held the risk transfer for successful integration, was a critical focus of the Confederation Line Extension Project procurement process.

All complex rail systems use some form of control system to manage vehicle movements, speeds, and critical safety features. CBTC uses real-time telecommunications between the train and track equipment for effective traffic management and infrastructure control. With CBTC systems, the position of a train is shown more accurately than with other traditional signaling systems. This results in a more efficient and safer way to manage the railway traffic such that LRT systems like Confederation Line are able to improve headways while maintaining or even improving safety.

The signalling system of the Confederation Line is a sophisticated Communications Based Train Control (CBTC) system. The signalling subcontractor that was included in the RTG solution is Thales, a French multinational corporation, who provides train-signalling systems all over the world. These systems have proprietary software and design that cannot be made compatible with other signalling providers, so the existing CBTC solution—as designed and implemented in the Stage 1 Confederation Line Project—is required to be expanded over the Stage 2 system.

One of the core features of a Design Build contract, as it related to what underpins the risk transfer, is the ability for the main contractor to secure and negotiate terms with its own subcontractors. In order to transfer this risk to EWC, and to ensure that the technical specifications of the signalling system were well understood within workable contractual terms that could be negotiated in a way that worked for proponents, the City held a series of tri-party Commercially Confidential Meetings between Thales, the City, and all three proponents during the in-market period.

These meetings resulted in a signalling system subcontract agreement that formed part of the RFP and, upon execution of the subcontract by EWC (or its Construction Contractor) and Thales, assigns the risk of successful implementation and integration of the signalling system to EWC under the Project Agreement. Given that the signalling system subcontract terms and conditions needed to be considered and reflected in the schedule and price of each of the proponent's bids, Thales was required to use the most conservative of the proponent's schedules and constraints in the development of the subcontract. Some noteworthy features of this unique arrangement include:

- The Thales subcontract value will be based on negotiation with EWC but was negotiated with the City as no greater than $70 million. This "no greater than price" was based on the most conservative proponent schedule. Once Council approves EWC then the negotiated price will form part of the Project Agreement and the City will share the savings with EWC on a 70% / 30% split;
- The Thales subcontract value will be paid on a milestone basis as certified by the Independent Certifier and not on an earned value basis like the remainder of EWC's works; and,
- If Thales fails to perform, EWC is provided certain relief (i.e. no liquidated damages accrue to the extent cause by Thales' delay; event of default caused solely by Thales gives EWC an additional 180-day cure period). If determined that Thales will not be able to perform the City and the EWC will work collaboratively to determine a solution as a variation of the PA.

The signalling system subcontract will be executed between EWC and Thales at financial close solidifying the risk transfer on system integration to the EWC. The City only carried risk on the signalling system integration in the extremely unlikely event that Thales becomes insolvent, or ultimately fails to perform the subcontract.

Other Confederation Line Systems

Though the CBTC is the most complex and significant part of the systems required to be expanded as part of the Confederation Line Extension Project, there remain a myriad of lesser systems (fire, passenger notification, surveillance, etc.) that need to be extended throughout Stage 2. The Confederation Line Extension Project Agreement outlines the systems that were used on the Stage 1 project and required EWC to design and build the Stage 2 systems to seamlessly connect with these systems. EWC's responsibility is to bring their systems and cabling to the demarcation point at the Stage 2 terminus points; from these locations the City will subcontract the necessary companies to integrate these systems with the Operation Control Centre.

System Integration Verifier

Given the complexity and importance of system integration and to confirm that both parties (City and EWC) are meeting their obligations as per the above, a System Integration Verifier will be jointly procured. The role of the System Integration Verifier will be to monitor critical system implementation and integration milestones and certify that the testing has validated their successful implementation. This will avoid disputes at critical project development points on issues of system integration. In the event of dispute in respect of systems integration works, the Systems Integration Verifier will act as the arbiter of such dispute as between the City, EWC and/or RTG.

Confederation Line - Interface Agreement

Having contracted with RTG for the maintenance responsibilities of the EWC constructed civil infrastructure on the Confederation Line extensions, it was necessary to develop a contractual mechanism between the two parties (RTG and EWC) through which RTG could secure the performance of EWC's warranty obligations. This interface agreement sets out the responsibilities of RTG, EWC and the City with respect to defects on the east and west extensions and timelines for response and performance of warranty obligations by EWC.

In a traditional P3 project like Stage 1 Confederation Line, the construction and maintenance business entities within the private sector partner typically have an internal interface agreement between the two entities with the maintenance team holding responsibility for any deductions due to failures on the civil works during the warranty period and beyond. In the context of Confederation Line Extension Project, the City mimicked this interface agreement and negotiated its terms through tri-partite meetings during in the in-market period. As a result, EWC is responsible for interfacing with RTG during the warranty period of the maintenance term and is responsible under the Confederation Line Project Agreement for liquidated damages for loss of system availability for component failure on the east and west extensions during the warranty period.

Vehicle RFP

As part of the Stage 2 preliminary engineering, the City had to determine how many vehicles were required to meet expected customer demand and ensure reliable run times.
For Trillium Line, the vehicle fleet is right-sized from day-one service through to 2048. This means that the City will not be required to purchase additional vehicles as ridership grows to 2048 levels. The fleet will be capable of maintaining headways and customer capacity based on ridership growth projects.

As part of the Stage 2 procurement process for Trillium Line, the City issued a Request for Expressions of Interest (RFEOI) in March 2017 for vehicle supply and received two submissions: one from Stadler and one from Alstom. In June 2017, the City issued a Request for Vehicle Supply Offer (RVSO) and received a bid from Stadler to service the Trillium Line expansion. The Stadler proposal was evaluated and determined to be compliant, and a contract with Stadler to supply new vehicles for Trillium Line was executed in Q4 2017.

As a result, Stadler will supply seven of their high efficiency diesel FLIRT models, which are 80 metres in length (double the length and passenger capacity of the existing Alstom vehicles that currently operate on the line). The $97 million costs associated with this purchase are reflected in the total bid price for the Trillium Line Extension Project.

The City has structured the Trillium Line Extension Project contract to transfer the risk of vehicle delivery, maintenance and train availability to TNEXT, while preselecting qualified vehicle suppliers that meet the City's requirements. This approach ensures the City is not caught in the middle of potential issues such as delivery schedule. For further clarity: it is the responsibility of TNEXT to deliver and commission the vehicles. In the event that either the first Stadler vehicle has not been delivered to the site 120 days prior to TNEXT's scheduled substantial completion date or the entire new Stadler fleet has not been delivered on or before the date which is 60 days prior to TNEXT's scheduled substantial completion date, TNEXT and the City will work together to achieve an interim substantial completion which will result in all of the infrastructure except for the new Stadler vehicles being completed and the Alstom vehicles being used to deliver an appropriate level of service at that time. TNEXT and the City will then work together with Stadler to ensure the undelivered Stadler vehicles arrive at the site and are integrated into the Trillium Line operations plan.

The approach also provided a balanced procurement in which the vehicle supplier could not have undue influence on TNEXT for the design, building, financing and maintenance of the Trillium Line Extension Project.

Additionally, TNEXT will also be responsible for overhauling and maintaining the Alstom Coradia LINT vehicles as well as handing all Trillium Line vehicles back to the City in a good state of repair in 2048.

Delay and Compensation Events

As per market standards in Ontario P3 projects, events giving rise to schedule and/or additional compensation under the PAs (including such risks described elsewhere herein as being retained by the City) are characterized as Delay Events and/or Compensation Events, Relief Events, Excusing Causes (applicable only during the maintenance period under the Trillium PA), Force Majeure Events, and events giving rise to the private sector partner to have a right to a Variation.

Delay Events are events which delay progress of design and construction work, and over which the private sector partner has little or no control (e.g. delays caused by Authority, certain site risks described elsewhere herein, etc.), and recognizing this, they are entitled to a schedule extension equal to the delay caused by Delay Event.

Compensation Events are generally the same events as those which give entitlement to relief as Delay Events, but which (in addition to, or in the absence of delay) cause the private sector partner to incur a loss or additional costs. In the presence of such events, the private sector partner is entitled to such compensation as would place it in no better or no worse position than it would have been in had the relevant event not occurred.

Relief Events are events occurring at any time over the Project term, and over which the private sector partner has no control but are best managed by the private partner (e.g. fires, natural disasters, utility failure, strikes / lockouts, etc.). Relief Events afford the private sector partner relief from affected performance, schedule relief equal to delay caused by the event; and, reimbursement of Debt Service Amount for the period of delay.

Force Majeure events are events occurring at any time over the Project term, and over which neither the City nor the private sector partner has any control, and which are likely to continue for prolonged period (e.g. war, terrorism, nuclear, radioactive, chemical or biological contamination, etc.). Force Majeure events afford the private sector partner relief from affected performance, schedule relief equal to delay caused by the event; and, reimbursement of Debt Service Amount for the period of delay. If the Force Majeure event occurs after Substantial Completion (Trillium Line Extension Project only) the payment mechanism is suspended, and Project Co is compensated for the maintenance and rehabilitation services performed during such period.

Excusing Event are events which occur during the maintenance period (i.e. only applies under the Trillium Line Extension Project PA) and over which the private sector partner has little or no control, which interfere adversely with, or cause a failure of, the performance of the maintenance and rehabilitation work (e.g. breach by Authority, suspension, labour disruption, etc.). Faced with an excusing event, the private sector partner is entitled to relief from the maintenance and rehabilitation obligations it is unable to perform and resulting deductions, and payment of Direct Costs resulting from the event.

Claims for any of the foregoing are structured to ensure the claims are meaningful and minimize the cost to the City in the following ways:

- The private sector partner is required to have demonstrated to the City's satisfaction that they have exercised their obligation to mitigate the consequences of the event (schedule and/or cost as applicable);
- There are strict notification and information requirements that when an event occurs to give the City the opportunity to work to mitigate the impacts and to track the implications of the risk through the remaining project implementation schedule; and,
- For certain claims (e.g. consequences of utility companies failing to perform works within the utility baseline report timelines), the impact of delay is only measured at the end of the project completion of design and construction, and if the occurrence of any of the foregoing events, or the consequential relief arising from such event is disputed, the dispute is generally deferred and consolidated with other such disputes after Substantial Completion to ensure that the delay and/or cost consequences were not overcome by other project implementation efficiencies.

Confederation Line – Rideau Transit Maintenance Agreement

At substantial completion of each of the east extension and west extension, RTG will take full responsibility (subject to EWC's obligations prior to Final Completion and EWC's warranty obligations during the DBf warranty period) for all aspects of the maintenance and service of the extended Confederation Line system and will be responsible for ensuring its full availability at all times.

RTG will remain at risk not only for the maintenance payments but also for payments to the City as the project's long-term lender until the end of the maintenance and service term in 2048. The City's exacting standards will be enforced to maintain every element of the Confederation Line to ensure high quality and serviceability.

RTG must also maintain the guideway and stations in good condition, including cleanliness and snow removal. It is also the responsibility of RTG to immediately address any vandalism, although the City will bear the costs of any vandalism repairs on a pass-through basis at stations or with respect to in-service trains, where the City maintains responsibility for security. RTG is, however, responsible for any vandalism at the expanded Belfast MSF where they remain responsible for access control and security.

Built into the expanded maintenance provisions with RTG is a series of penalty provisions to ensure that all elements of the system are in service during operation. These provisions cover the operation of the vehicles, elevators/escalators, heating and lighting, wayfinding, etc. The penalties continue to be apportioned in relation to the type and severity of availability failure and are calibrated to be strong incentives for immediate resolution. This penalty system is one of the advantages of the P3 procurement approach, as the strength of the penalties for non-compliance results in

better service reliability than that which typically occurs when these responsibilities are publicly managed.

As well, the Project Agreement outlines specific handover requirements at the end of the 30-year term, including an inspection regime in the concession's final years and specific asset handover condition requirements, which must be satisfied prior to the City taking back control over all assets.

Trillium Line – TransitNEXT Maintenance Agreement

Just as with the Confederation Line maintenance agreement with RTG, upon completion of the concession period to 2048, TNEXT shall transfer control of and responsibility for the Maintenance of the System, including all fixed equipment, Vehicles and fixed facilities which TNEXT has supplied, designed and constructed and maintained, to the City.

At the 2048 expiry date, the condition of the Trillium Line system is required to meet certain minimum standards as outlined in the Project Agreement. These requirements are intended to protect the City from excessive asset consumption during the Maintenance Period; to facilitate hand over of the System to the City in a condition that reflects proactive maintenance and rehabilitation during the Maintenance Period; and, to ensure that the System has sufficient remaining service life.

Prior to the 2048 expiry date, the City and TNEXT shall jointly perform pre-handover inspections to determine the state of repair and operation of the system. These pre-handover inspections will start no later than four and a half years prior to the expiry date in 2048*.*

Mobility Matters

Mobility Matters was built into the Project Agreement for both the Trillium Line and Confederation Line extensions to influence the proponents' approach to maintaining a high level of lane availability during construction and to encourage an approach to construction that minimizes the number and duration of lane closures on the Transitway and public roads. Building on the Lessons Learned from 2012 Confederation Line Project to minimize other mobility impacts. This strategic tool was again implemented for the Stage 2 projects to require proponents to state the planned road impacts and actually rent traffic lanes from the City with a real net present value (NPV) impact on their bid price to reflect traffic patterns impacts (including local transit) during construction.

More specifically, each proponent was required to commit to a specific estimate for Transitway and roadway lane closures based on their submitted construction plan. Each lane closure requirement was subject to a lane rental charge for each hour of affected block of roadway or Transitway segment and this cost was added to bids for evaluation purposes. General traffic lane closure costs were established based on roadway classification, time of day, and day of the week to reflect the magnitude of the impact on

the commuting public. Transitway lane closure costs were established based on the relative importance of each segment of Transitway, taking into account the volume of buses and the impact of the available detour routes, to reflect the magnitude of the impact on OC Transpo's operating costs and their customers.

Proponents were provided incentives to do substantial planning of their construction methodology and construction schedule by penalizing the impact of overestimating and underestimating their Mobility Matters targets. Underestimates are penalized by making the target binding: if the successful proponent exceeds their target by more than 10 per cent, the substantial completion payment to the contractor is reduced by the value by which the target has been exceeded, less 5 per cent. As it was recognized that this penalty structure could lead proponents to overestimate their Mobility Matters targets, overestimates are also penalized because the value of a proponent team's Mobility Matters target is incorporated into the bid price evaluation. Therefore, an overestimate on Mobility Matters would make it less likely that a given proponent ends up winning the contract. The result of this structure is that proponents had to have a very clear idea of their schedule and mobility impacts to the City of Ottawa in order to reduce their risk while continuing remain competitive in their overall bid.

In addition, Mobility Matters incents proponents to develop construction plans that keep the Transitway operating as late as possible into their schedule, while delivering on-time performance.

It should also be noted that throughout the course of the Stage 2 Project, there will be construction and systems integration and upgrade works that may impact service on the existing Confederation Line. Staff will ensure that impacts are limited to periods outside of peak service hours, including partial shortened weekend service and/or full weekend closures during which alternate transit service will be provided. All impacts will be communicated to customers well in advance of anticipated closures.

Construction System Safety

The health and safety of the public, as well as the protection of property and the environment are key priorities during construction. A Construction Security Plan will establish the procedures required to provide the necessary measures to achieve site security.

Construction Material Management and Disposal

There are no significant differences between Trillium and Confederation projects with respect to the requirements for soil excavation, excess materials management, and the use of receiving sites, including Trail Road. In the case of the Trillium Line Extension Project, the amount of excavation and potential for excess material management is significantly lower than the Confederation Line Extension Project, which includes a 3-kilometre cut and cover tunnel.

In both Confederation Line and Trillium Line extension projects, the PA stipulates that Proponents will prepare and submit an Excavated and Imported Materials Management Plan (EIMMP) to the City. The Plan will describe how they will manage all materials generated as part of the work, which could include soil, rock, solid waste, liquid waste, hazardous waste, and contamination. The Plan is reviewed and must be approved by the City prior to the commencement of excavation activities.

Where possible, Proponents plan to reuse as much of these materials on site for regrading, or in the case of stone, for concrete works. As this work falls in areas within City control, the City has introduced a preferred tipping fee for both Proponents to encourage solid non-hazardous soil material that cannot be used on site to be hauled to The Trail Waste Facility.

Table 10: Tipping Fees for Non-Hazardous Soil

Class No.	Soil Class	Tipping Fee ($/tonne)
1	Soil that meets MOECC Table 1 standards	10
2	Soil that meets MOECC Table 1 standards but is or may be salt impacted	10
3	Other soil that does not meet the Table 1 standards, but in accordance with O.Reg. 347/05 is classified as non-hazardous waste	10
4	Garbage which includes any material that contains deleterious material such as waste	112

There are distinct additional advantages to the City for offering this reduced rate, as without this additional material, the City will likely be forced to otherwise purchase clean fill for landfill cover, which would be a significant cost to the taxpayer. As a result of the projected quantities of excess soil available from the Stage 2 OLRT Project, Solid Waste Services recommend Council approve a reduced Trail Waste Facility tip fee for solid non-hazardous (Stage 2) soils as noted above. The tip fees will ensure Solid Waste Services is able to manage the inbound soil and meet its environmental compliance requirements while not negatively affecting its operational budget.

The specified tipping fee for Class 3 soil is only available to EWC if it enters into an agreement with Trail Waste Facility to provide at least one tonne of Class 1 or Class 2 soil to Trail Waste Facility at the prescribed tipping fee for each tonne of Class 3 soil.

Noise and Vibration during Construction and Operation

Both proponents' designs incorporate best practices noise attenuation methods, including floating slab tunnel infrastructure on Confederation Line West extension. In addition, the procurement documents set out exacting performance requirements to which the proponent must adhere. As part of the City's preliminary engineering program, acoustics specialists from Capital Transit Partners (CTP2), the City's Owner's Engineers, conducted a review of industry best practices for noise and vibration

mitigation criteria for various users along the Confederation Line east and west extension alignments and the Trillium Line alignment, including residential and commercial buildings.

That assessment has established a noise and vibration standard that will protect adjacent buildings, including those identified as sensitive receptors. Noise levels will be baselined and the respective proponent will work with the property owners to meet performance specifications and coordinate construction activities to minimize impacts. As established by the City's approved EAs for the Stage 2 project, there are no unique noise and vibration conditions present in Ottawa that cannot be addressed through consultation with property owners, and the application of modern construction techniques and proper maintenance practices.

Furthermore, to ensure that the concerns of all stakeholders located near the alignment are taken into consideration, the City specified that EWC and TNEXT engage acoustical engineers to undertake a detailed noise and vibration assessment along the project alignments. That assessment will require consultation with property owners and other affected stakeholders nearby to understand their day-to-day operations as they relate to noise and vibration impacts. Following the assessment, the proponents will develop specific noise and vibration mitigation measures as part of the project's final design and will maintain the light rail system to ensure that the mitigation measures remain effective in the future during normal operations.

While some construction-related noise will be unavoidable as the Stage 2 extensions are being built, EWC and TNEXT's construction methods and mitigation strategies will minimize disruption to the best extent possible.

Variations

Both the Confederation and Trillium Line projects layout procedures to make any change to the Works called a Variation process. Variations can be initiated after commercial close of the contract by either the City or EWC (for the Confederation Line Extension Project) or TNEXT (for the Trillium Line Extension Project).

Regardless of who initiates a Variation, EWC or TNEXT are to first deliver an estimate to implement the suggested change, which includes a proposal that describes and provides a rationale and any impacts on schedule, performance of the works, project requirements and costs. In the estimate, costs are generally limited to prescribed direct costs and may represent an increase or decrease to overall project costs. The Project Agreement stipulates limitations on what can be considered direct costs, as well as limits to the total overhead and profit margins that can apply.

The City reviews all Variations for PA compliance and validates estimates for fairness and legitimacy. The City can either accept or reject proposed Variations and estimates, and the acceptance process can involve multiple rounds of negotiations.

If the City does not proceed with a Variation it initiated and for which an estimate has been received, the City can be held to reimburse EWC or TNEXT for all direct costs incurred by EWC or TNEXT in preparing the estimate.

If an estimate is not agreed upon by the City and EWC or TNEXT (subject to certain exceptions), or if the City requires a variation to be implemented urgently, the City may issue a Variation Directive, thereby obliging EWC or TNEXT to proceed promptly with the Variation before all terms and conditions are accepted by all relevant parties.

Traffic and Transit Management

As was experienced through the Stage 1 project, proper planning and design by the City's Traffic staff, along with the implementation of Mobility Matters as well as community outreach and education, result in detours that can minimize impacts on the City's transportation network.

As outlined in the March 2017 report, one of the Lessons Learned from the Stage 1 Confederation Line project is the importance of anticipating and planning for the mobility impacts of construction as early as possible in the design stage of the project.

A slightly more prescriptive contractual approach to traffic and transit management has been taken for Stage 2 LRT. Significant preliminary traffic engineering was undertaken with a focus on construction staging for each major element of both Confederation Line and Trillium Line extension projects, and restrictions on allowable lane closures were incorporated into the project output specifications. This approach allows for clear expectations to be communicated to the public, to other City departments (facilitating close coordination internally), and to the contractors.

In contrast to the Stage 1 project approach, the Stage 2 project prescribed routing to be used for Transitway detours to the contractors, based on an analysis of options conducted. This again facilitated clear communication to the public at a very early stage where there would be impacted levels of transit service on City streets. It also allowed for other City departments to be informed with more certainty as to where new construction would be taking place, which resulted in some long-term City priorities being incorporated into the Stage 2 construction at a reduced cost compared to the projects being standalone undertakings farther in the future. Certain measures, such as constructing cycle tracks on the west side of Woodroffe Avenue between Iris Street and Baseline Road and constructing protected intersections at key locations along Scott Street, will result in higher levels of pedestrian and cyclist safety during Transitway detours while advancing City priorities in the context of its Complete Streets Framework.

Despite significant public concern regarding the safety and efficiency of operating the Transitway detours on the Stage 1 project, a safe and reliable system was achieved throughout all phases. The Stage 2 approach retains the elements of the Stage 1 structure that were successful: keeping the contractor responsible for the overall operation of the detour routes, while providing greater public confidence by having more information available about the facilities to be constructed prior to contract award.

The March 2017 report provided a refined short-list of traffic and transit staging options, based on an analysis of traffic impacts, transit running times, capital costs, operating costs, property implications and community impacts which have since been finalized by the preferred proponents, and are outlined in Appendix 7.

Pedestrian and cyclist mobility during construction

Both the Confederation Line Extension and Trillium Line Extension Project Agreements place significant importance on maintaining pedestrian and cyclist facilities. Throughout the project, all trails, pathways and MUPs must remain open unless specifically identified; for example, the Osgoode Link Pathway is permitted to close for Trillium Line construction, with a detour provided via Rideau Road and Albion Road. Wherever pathways not specifically identified must be closed for construction, the preferred proponents are obligated to provide a detour route that adds no more than 20% additional distance. The detours must be a paved asphalt surface, unless the duration is less than seven days, in which case a temporary granular pathway detour is permitted.

Traffic and Transit Management Plan

A Traffic and Transit Management Plan (TTMP) will be in place to confirm and approve all road modifications and impacts that are required to complete the construction of certain elements of the system. Each area of the project (east, west, and south) will have its own specific plans based on the work required in that area. Roadway impacts will include temporary road closures, lane closures, and detours. The City will use provisions in the PA to ensure that traffic control plans used to accomplish construction minimizes impacts to all road users.

Any proposed road or pathway closure resulting in the need for detour routes or bus stop relocations must be proposed to the City by EWC or TNEXT, and City staff will review and propose modifications (within the parameters of the Project Agreement) to optimize road closure durations, detour route selection and operation, and bus stop locations.

Advance notice for the public, via fixed signs, portable variable message signs, public announcements on City website/social media streams, will be initiated considering the magnitude of the impact. Information will be provided to the public prior to the implementation of any road or pathway closure or bus stop relocation, with the aim of allowing the public to plan their travel mode and routing accordingly, as well limit the inconveniences associated with construction.

As with the Stage 1 LRT project, the City will employ a small team of traffic management staff internal to the Rail Construction Program. This team will meet regularly with representatives of other City departments to ensure strong and consistent coordination and consensus on traffic and transit management issues. The broader City team will meet on a regular basis with the contractors' traffic teams to plan impacts well in advance, and mitigate these impacts from the perspectives of all users of the transportation system.

E. City Supporting Activities

Stakeholder Engagement

Public engagement has helped shape the Stage 2 LRT project from the initial planning phases to establishing project parameters that will guide the final design and construction. The City has conducted a thorough consultation program and maintained ongoing dialogue with numerous stakeholders throughout the development of the Stage 2 LRT project.

To date, the project team has hosted or attended more than 150 stakeholder activities, consisting of design and technical workshops, open houses, information sessions, committees, working group meetings, community presentations, and Councillor briefings. Resources for stakeholders and the general public include the project website, www.stage2lrt.ca (more than 225,000 users), and a project newsletter that currently attracts over 1,300 subscribers. The project team maintains a general email inbox that has received approximately 700 project enquiries to date.

The consultation strategy included a staff review of the Lessons Learned from Stage 1 to understand the importance of identifying specific communities along the alignment that would be affected the most by construction. As a result, residents along the Byron Linear Park and Richmond Road corridor, and residents near the extension to Moodie Drive, were provided extensive opportunities to review the project plans and provide input.

As the project moves forward into the construction phase, stakeholder outreach and engagement activities will benefit from the strong tools and relationships established in the planning and procurement phase, building off the experience from Stage 1 construction.

The City's goal is to directly inform impacted communities of construction techniques being used, potential noise and vibration impacts, impacts to transit service at affected stations, and all modes traffic detouring. The City will act as the public face of the project and lead on all stakeholder relations and communications activities with support by each preferred proponent.

Indigenous Engagement

City staff continue to consult and engage with representatives from local Indigenous communities on the Stage 2 LRT project. These include: Algonquins of Ontario (AOO), Algonquins of Pikwàkanagàn, Kitigan Zibi Anishinabeg First Nation, and Métis of Ontario.

An Indigenous Engagement Strategy for the Stage 2 LRT project has been developed, to, among other things, ensure that Indigenous communities are apprised of the Stage 2 LRT project's progress, including, alignment advancements, station locations, environmental assessments/reports, the public art program and archeological

impacts/investigations. The strategy also includes opportunities for potential economic development, capacity building, and opportunities that the project may have to incorporate Indigenous culture, heritage or other interests.

The City will continue its commitment to providing project updates and meetings with members from local Indigenous communities on a regular basis until such time that the Stage 2 LRT project is complete.

As part of the City's ongoing engagement with the Algonquin's of Ontario, an initiative was developed to celebrate and strengthen Algonquin art and culture throughout Ottawa, which resulted in the commissioning of an Algonquin Directional Signage Symbol (the "Algonquin Wayfinding Wheel"). The symbol was designed through a participatory process involving Algonquin elders and community members from Algonquins of Ontario, Algonquins of Pikwàkanagàn First Nation and Kitigan Zibi Anishinabeg.

Figure 11: Algonquin Wayfinding Wheel

The symbol, originally initiated through the Stage 1 LRT project, will be fully implemented throughout Stage 1 and Stage 2 stations.

Public Art

The Stage 2 Public Art Program has developed a public art plan, based upon the understanding that public art in transit facilities allows for transformative and positive experiences by the transit user.

Based on lessons learned from Stage 1 Confederation Line Project, the City has expanded the Stage 2 Calls to Artists to the international market. The City has also shifted from individual artists, assigned to a single station artwork installation, to a format of grouping of stations to allow for the development of creative narratives. Three separate RFQs, two for Confederation Line and one for Trillium Line, will be released. Artist teams will be identified, as recommended by external selection committees, to design and implement public art along Stage 2.

Capacity building is a key component of the Stage 2 Public Art Program. As such, during the planning phase, and in the lead up to the selection of the artist teams, several capacity building initiatives were undertaken for local and Indigenous artists. The City is also offering a Public Art Learning Series for artists and arts professionals with key knowledge, tools and methods to take ideas from the studio into the field of public art, along with information and advance opportunities for professional development in public art.

Property Acquisition

Staff continue to assemble the property requirements to support the Stage 2 Project as directed by Council in the March 2017 *Stage 2 Light Rail Transit Implementation – Project Definition and Procurement Plan Report* (ACS2017-TSD-OTP-0001). The majority of the required property is now under contract or has been purchased or expropriated and, while some property acquisitions remain outstanding, staff are working towards timetables for property availability contained in the Project Agreement and have implemented appropriate tracking and other measures to ensure that risks associated with property acquisition are appropriately managed.

Expropriations and Private Property Acquisition Program

The City has negotiated agreements to provide for the acquisition of property interests required for the Stage 2 Project, including the Third-Party Property Agreements which establish frameworks for cost-sharing and for the construction, use and maintenance of infrastructure including any infrastructure which will improve connectivity to the City's growing rail transit system or which will improve lands located in close proximity to the rail corridor. These include agreement with Carleton University, the National Capital Commission, Ottawa Macdonald-Cartier International Airport Authority, Public Works & Government Services Canada (PSPC), South Keys Shopping Centre, and VIA Rail. These are summarized in Appendix 1.

Where the City has been unable to negotiate an agreement, required property interests have been expropriated to ensure they are available to meet construction timelines. In March 2017, Council approved the following process for the authorization of expropriations required in order to secure property for the Stage 2 Project:

- Staff will identify property interests for which expropriation by-laws are recommended;

- Staff will review the property interests which are recommended for inclusion in an expropriations by-law with the Mayor and the Ward Councillor and receive their concurrence; and;
- Staff will prepare the appropriate by-law and circulate the by-law with an explanatory Memo to Council with the draft agenda that will include the relevant by-law, and this Memo will be listed as correspondence on the Council agenda.

By applying these processes as directed, the City has acquired property interests from 17 separate owners through expropriation, with additional expropriations expected to be completed in the coming months.

Staff are actively working towards achieving settlements of compensation payable with respect to expropriated interests and are continuing to negotiate with owners for the remaining property interests required for later phases of construction of the Stage 2 Project.

Real estate transactions and offers of compensation have been approved in accordance with delegations of authority contained in *Delegated Authority By-law No. 2016-369*, as amended or, when required, by the General Manager, Corporate Services and City Treasurer in accordance with the authority delegated by Council in accordance with the recommendations of the March 2017 report to approve any real estate transaction involving the acquisition of any interest in, or right to use, real property for the purposes of the Stage 2 Light Rail Transit Project and related works, including any offer of compensation payable under the *Expropriations Act*.

Property Budget

Based on the current scope and preliminary design of the Stage 2 Project, staff have developed a budget for property acquisitions of $78 million, which takes into account current estimated property values, Harmonized Sales Tax obligations, contingencies, professional services (appraisal, legal and surveying), and other costs associated with the settlement of compensation claims.

As directed by Council in March of 2017, staff will report the details of the real estate transactions related to the Stage 2 Project, approved under delegated authority, including expropriations, to the Finance and Economic Development Committee and City Council after all property interests required for the Stage 2 Light Rail Transit Project and required works have been acquired by the City and all claims for compensation have been settled.

Delegations of Authority

This Report recommends specific delegations of authority to the City Manager and the General Manager, Corporate Services and City Treasurer to execute the Memorandum Agreement with Carleton University, the Memorandum of Agreement with PWGSC and the Crossing Agreement with VIA Rail Canada Inc. As noted, these agreements are described in more detail in Appendix 1

This Report also recommends a general delegation of authority to the Director of the Corporate Real Estate Office to approve, execute, deliver, amend, extend and complete any document, agreement or instrument resulting from or amending any real estate transaction approved by the General Manager, Corporate Services and City Treasurer or any agreement described in Document [x] attached to this report provided that the financial implications of such resulting document, agreement, instrument or amendment is within the project budget for the Stage 2 Project and has the concurrence of the Mayor and the Councillor whose ward includes the relevant property.

Many of the Agreements summarized in Appendix 1, as well as the property acquisition agreements negotiated by staff, will require the execution of ancillary agreements and other documents. In addition, amendments to the agreements may be required over the course of the Stage 2 project as the design and construction of the two systems proceeds. The purpose of this recommended delegation to the Director of the Corporate Real Estate Office is to simplify the administration of agreements which have already been approved and the completion of the transactions contemplated in these agreements.

Permits, Licences, Approvals and Agreements

As part of the Confederation Line Extension and Trillium Line Extension Project Agreements, the City developed a set of standards with respect to timelines and responsibilities required to issue certain specified permits, licences, approvals and agreements (PLAA) to EWC and TNEXT. These timelines and responsibilities fall on the City to maintain.

Attached as Appendix 8 and Appendix 9 are the PLAA Tables for Confederation Line and Trillium Line.

Regulatory Requirements

Background

As an urban light rail transit (LRT) system Confederation Line (including any expansions or extensions) is subject to a Delegation Agreement between the City and Transport Canada, whereby the City has assumed general rail regulatory responsibility over this and any other LRT system the City decides to build and operate. In support of this arrangement, Council approved the Ottawa Light Rail Regulatory Framework on September 23, 2015.

As a heavy or conventional rail commuter line system, Trillium Line (including any expansions or extensions) is not covered by the Delegation Agreement, and continues to be subject to rail regulatory oversight by Transport Canada under the *Railway Safety Act* (i.e. safety standards and requirements), the Canada Transportation Agency (i.e. operating approvals, insurance requirements, service obligations and rail line access matters), and the Transportation Safety Board under Transportation Accident

Investigation and Safety Board *Act* (i.e. accident and safety occurrence investigations and assessments).

Accordingly, in respect of the Stage 2 projects and the rail regulatory related approvals that are required by the City (and its contractors) to proceed with construction activities:

a. for Confederation Line, no approvals are required from Transport Canada, the Agency, or TSB;

b. for Confederation Line, the City will carry out its regulatory oversight role through the execution, administration and enforcement of the Stage 2 project agreement and the ongoing adherence to Transportation Department policies and procedures with periodic compliance monitoring by the Regulatory Monitor and Compliance Officer;

c. for Confederation Line, the City's OLRT Regulations will be modified by way of minor changes to the previously adopted LRT By-law to align it to the City's 2017 organizational changes and re-naming of senior officer positions and through administrative level updates and modifications to relevant Transportation Department policies and procedures, as well as incorporate the Project Agreement with East-West Connectors. The By-law will be placed on City Council's Agenda for enactment following the execution of the Project Agreement; and,

d. for Trillium Line, various approvals and confirmations from Transport Canada, the Agency and other federal authorities are required as summarized below.

This part of the report does not address other project related approvals already obtained by the City (e.g. environmental assessments), as already outlined by the report, or other normal course Federal and Provincial permits, licences and other approvals that may be required by the City's contractors for specific aspects of the Confederation Line and Trillium Line projects, including operations.

Trillium Line Approvals

As noted, a number of approvals and confirmations are required from the Canada Transportation Agency, Transport Canada and related Federal agencies. O-Train Planning and Rail Construction Program staff and Legal Services (with some involvement of external counsel, Borden Ladner Gervais LLP have been diligently engaged in discussions with these regulatory agencies for many months now in processing these matters. Very good progress has been made, certain reviews are ongoing and outstanding approvals and confirmations are currently expected to be in place in a timely manner, assuming the agencies continue to respond in a diligent manner, as they generally have to date.

In brief summary, the relevant approvals and confirmations are as follows:

a. **Canadian Transportation Agency (CTA) Approval of Construction**

Before the City (or its contractors) can commence construction work of any kind, it requires the formal approval of the Agency, which entails:

i. Variance to Certificate of Fitness (COF): modifications to the COF (i.e. City's rail line authorization) to reflect the changes to the Trillium Line system. This involves the completed review and final approval by the Agency of insurance policies placed by Project Co which should be finalized concurrently or shortly after the Trillium Line Financial Close;

ii. Environmental Effects Evaluation: a confirmation, that it satisfied itself that the appropriate scope of the environmental assessment was carried out in relation to this project, should be received from the Agency concurrently with the COF Variance as per approved in a., and the Construction Approval, as per below;

iii. Construction Approval: for the issuance of this approval, the Agency must complete its review of the City's design plans and be satisfied that local impacts, including possible impacts on Indigenous Communities, have been appropriately considered and addressed, including through possible further consultation with those persons who may be impacted by the project.

City staff, with assistance of City Legal, have provided significant material to, and have had extensive discussions with, Agency staff in respect of these matters. On February 1, 2019, The CTA advised the City that the application for approval to construct has been deemed complete. The CTA has ordered the City to publish its notice in local newspapers announcing the opening of the Agency's public comment period. Further discussions and reviews are in progress and are currently expected to be substantially complete in March or shortly thereafter. At this point, the CTA cannot commit to a fixed date for the issuance of the Construction Approval.

b. **Transportation Canada Approvals and Confirmations**

City staff have also been actively engaged with Transport Canada staff in respect of the following:

i. AZR Confirmations: To address Airport Zoning Regulations (AZR) and infrastructure height restrictions that might apply to the City's planned overpass structure at Leitrim Road, the City has submitted an application to Transport Canada for an exemption. This City application, as supported by the airport and navigation authorities, is currently being reviewed by Transport Canada staff. The City has been advised that a response from Transport Canada will be forthcoming shortly.

In addition, the City team has been engaged in discussions with Transport Canada regarding the application of the AZR requirements to the Trillium alignment between Lester and Leitrim Roads, which is located within a segment of existing railway corridor. The City team has filed materials with Transport Canada in support of its position that the existing railways corridor is exempt from the application of the AZR.

ii. Notices: In due course, the City must file with Transport Canada, and distribute publicly to affected persons, a Notice of Railway Works and a Notice of Change in Operations (to address changes in train vehicles, track alignment, and operating/maintenance practices). The City team has been engaged in discussions with Transport Canada staff and these matters are in hand.

iii. Variance to Railway Operating Certificate: Based on the extended Trillium alignment and other changes to the system an approved variance to the City's current Operating Certificate will be required before commencement of operations on the extended line. Discussions with Transport Canada staff have already commenced and will continue through the Stage 2 construction period.

iv. Other Confirmations: The City team has also now clarified and confirmed with Transport Canada the extent to which, if at all, various historical orders or directives from the Federal regulatory authorities (i.e. including predecessors to Transport Canada and the Agency) regarding the Trillium Line railway corridor might still be outstanding to ensure no adverse impact to the Stage 2 plans. The City team is satisfied that based on the confirmations received these historical orders do not impair or challenge in any way the Stage 2 project.

Tree Compensation Plan

As part of the Project Agreement for both Trillium Line and Confederation Line extensions, EWC and TNEXT have each agreed to robust Tree Compensation Plans that will provide a 2:1 tree replacement value. Each plan must conform to City of Ottawa standards and comply with the Federal Land Use, Design and Transaction Approvals (FLUDTA), which outlines the NCC's requirements for work done on federal lands.

For the Trillium Line, there is not enough land available on the alignment to physically replace trees at a 2:1 scale. A hybrid approach of 1:4 tree replacement and financial compensation will take place to achieve a 2:1 replacement net value. To compensate for the difference, $1.5 million will be provided to the City's Forestry Branch to support the development of Ottawa's urban canopy.

Rail Construction Program

Governance

Finance and Economic Development Committee

Since 2011, Finance and Economic Development Committee (FEDCO) has held primary governance and oversight for the Confederation Line project, and subsequent to this, the Stage 2 LRT Project. FEDCO was selected to oversee the execution of these projects not only with respect to construction, but also due to the numerous cross-jurisdictional matters, including contract management and procurement, property acquisition and real estate, budget, and economic development and partnership

arrangements. FEDCO provides the ideal venue to discuss these matters as the Mayor, all Standing Committee Chairs, and the Chair of the Transit Commission, sit on the committee. This governance structure was re-affirmed through the 2018-2022 Council Governance Structure Review (ACS2018-CCS-GEN-0028).

In addition to FEDCO, Transportation Committee and Transit Commission have also dealt with matters relating to the Confederation Line and the Stage 2 LRT projects. Transportation Committee has retained governance pertaining to the Statements of Work for the Environmental Assessments, while Transit Commission has held oversight over matters directly related to the operations of the O-Train transit network and the customer experience, including wayfinding, customer facing elements, branding and advertising standards, among others, as per the May 27, 2013, FEDCO governance report (ACS2013-PAI-DCM-0001).

This model has worked efficiently for the Confederation Line and Stage 2 LRT projects. Council, during its consideration of the Term of Council priorities on July 8, 2015, retained this model for Stage 2 by assigning primary governance to FEDCO, with the support of Transportation Committee and Transit Commission, as outlined above.

With respect to the other elements of the Stage 2 Project Governance, staff is proposing the following:

Executive Steering Committee

On July 14, 2011, as part of the *Implementation of the Ottawa Light Rail Transit (OLRT) Project* report, Council approved that the procurement process and project implementation would be overseen by the City's Executive Steering Committee (ESC).

As approved by Council in March 2017 (ACS2017-TSD-OTP-0001), it is recommended that the Stage 2 Project report to the same ESC to provide approval and act as a mechanism for all decision-making and escalation purposes. The ESC membership is comprised of the following:

- City Manager (Chair);
- General Manager, Transportation Services Department;
- Director, Rail Construction Program;
- City Clerk and Solicitor;
- General Manager, Corporate Services and City Treasurer; and,
- Other guests, as required.

An Executive Advisor may be appointed at the discretion of the City Manager.

Rail Construction Program

The Rail Construction Program has been established to manage the delivery of construction of new passenger rail service in the City of Ottawa starting with the Stage 2 LRT project. The Rail Construction Program was established in July 2017 in order to participate in the Stage 2 planning and procurement process and to ensure that the team fully understands the scope and content of the project. The full mobilization of the team will coincide with the approval and launch of the City's Stage 2 Project.

The Rail Construction Program office will constitute an integrated team of project management, design, and construction professionals who will oversee and ensure that the Confederation Line and Trillium Line extension projects are executed in full compliance with the requirements of the Project Agreements.

The Rail Construction Program represents a team of existing internal City staff, made up of key members with diverse experience from the O-Train Planning and O-Train Construction offices, and new City resources and expertise. Specific project capabilities, such as communications and stakeholder engagement, property management, traffic planning and management, utilities management, planning, project management, and engineering have been sourced from within the City. Additionally, a focused effort has been made to complement existing City resources with new City resources, recruited from the private sector, that have specific and demonstrable experience with light rail design and construction including with light rail vehicles, signals, and systems.

In 2010, with the creation of the Rail Implementation Office, the City ran a two-stage procurement, RFQ and RFP, to secure Preliminary Engineering (PE) services for the Confederation Line Light Rail Transit Project. Four joint venture firms were qualified through the RFQ process, and Capital Transit Partners (CTP) was awarded the contract on the basis of Best Value after proposal evaluation and negotiation.

CTP – a joint venture made up of STV Canada Consulting Inc., Aecom, and Morrison Hershfield Limited – led the preliminary design and development of the Project Specific Output Specifications (PSOS) for the Confederation Line Project. In order to ensure efficiency and maximize the value-capture of the unique experience CTP had acquired during their work on the Confederation Line project, the City awarded a contract to undertake the Project Management and Preliminary Engineering role for the Stage 2 LRT Project with an option to extend the contract to include the provision of construction oversight and quality management as previewed in the September 1, 2015 Report to Finance and Economic Development Committee.

The City will be reviewing and negotiating the CTP proposal to extend the contract for all activities leading to the achievement of Revenue Service for both the Trillium and Confederation Line extensions. Stage 2 contract award in 2019, with costs associated with CTP engagements to the end of 2025 being covered through Stage 2 LRT Project funding.

This results in a vertically integrated private and public sector team who will form a single point of accountability for oversight of the delivery of the entre Stage 2 program and ensuring the performance of TNEXT, EWC and RTG each meet all of their contractual obligations. This model will ensure appropriate matching of design and construction competencies, availability of specialist engineering skills, which are in high demand in the market, and will provide the City with efficiencies in project oversight to help minimize costs and maximize schedule efficiencies.

This team will be leveraged to provide mentoring and coaching to the City team as we grow our internal experience and expertise in rail construction. Additional specialist resources including legal, financial, and specialized engineering services will be engaged on an as-need basis to assist with project delivery.

The Rail Construction Program, led by the Director, consists of four Branches to oversee the execution of the Stage 2 Project. The intent of this structure is to closely match and align the City team with the organizational structure of the various private sector teams. In the organizational design, it was also important to ensure that there is appropriate capacity and capabilities to monitor and report on the progress (monthly earned value) of the design and construction works.

Program Management and Technical Services Branch

The Program Management and Technical Services Branch is responsible for monitoring, verifying compliance, and enforcing the requirements of the two Project Agreements. The Branch is also responsible for monitoring project finances, and specific City of Ottawa technical functions, including traffic management, property acquisitions, and utility management.

Design Management

The Design Management Branch will oversee and review all design submittals at each stage of the design process. A team of design engineering professionals and SMEs will review each aspect of the design of the Confederation Line and Trillium Line projects prior to design finalization and construction. This unit will coordinate and consolidate feedback on design submittals from all key stakeholders including, but not limited to, the City's Transportation Services and Planning, Infrastructure and Economic Development (PIED) departments, National Capital Commission (NCC), Ministry of Transportation – Ontario (MTO), and the Airport Authority. The Design Management Branch will also oversee specific capital projects in support of Stage 2, including City radio coverage upgrades, transit operations control centre (TOCC) upgrades, and fare collection implementation.

Construction Management

The Construction Management Branch will monitor, verify compliance, and inspect the quality of all Confederation Line and Trillium Line construction works. This team has been mobilized to assist with oversight of the Belfast Yard expansion and will work

closely with the design-build teams as they initiate their preliminary works. Construction work such as site investigations and surveying, preliminary site clearing, geotechnical testing, and mobilization of construction staging sites is expected to begin on both contracts immediately following contract award and this team will be in place at that time to provide support and oversight.

A team of construction inspectors will inspect construction works throughout all phases of construction, including the testing and commissioning phase of the projects, and will coordinate RTG/RTM participation on the Confederation Line, as required. Support from the OE team will be leveraged to with assist with temporary or short-term increases in construction monitoring requirements during peak periods of construction activity.

Operational Readiness

The Operational Readiness Branch will work in close coordination with various City departments and service areas throughout the course of the project, to coordinate, plan and eventually launch the three phased openings of the Stage 2 extensions. This will ensure that the extended Confederation Line and Trillium Line systems, as well as the City of Ottawa departments, including OC Transpo, are ready for operation. This will include overseeing the safety certification processes, security certification processes, public art project delivery, and interface requirements with existing operations for training, access, and readiness verification.

City of Ottawa Partners

In addition to the Rail Construction Program oversight, the project will leverage support from the City, including OC Transpo, Traffic Services, Transportation Planning, Emergency and Protective Services, PIED, and Building Code Services. The additional support from specific service areas and external funding partners will help ensure that the City's commitments to Council, third parties, stakeholders and regulators are fulfilled, and that the City's obligations under any permits, licenses or approvals are met.

The Rail Construction Program is currently managing the Belfast Yard MSF expansion and the Confederation Line Alstom fleet expansion projects.

RURAL IMPLICATIONS

Rural communities will benefit from the expanded public transit network. Specifically, the stations at Trim Road, Bowesville Road and Limebank Road are near many rural communities and provide many park and ride spaces. For these commuters, the LRT will provide reliable and comfortable transportation to the downtown core, as well as to major institutions (hospitals, universities and colleges) and work places.

In addition, the LRT is expected to take vehicles off the road and create faster commute times for people traveling outside the Greenbelt.

CONSULTATION

Public consultation, stakeholder outreach and communication for the Stage 2 LRT project is outlined in the City Supporting Activities section of this report. Moving forward, the Rail Construction Program has developed a Public Consultation Program and an Indigenous Engagement Program.

LEGAL IMPLICATIONS

There are no legal impediments to implementing the recommendations of this report. This report includes summaries of the material terms and conditions of certain legal agreements related to Stage 2, but does not describe all the terms and conditions of such legal agreements. Moreover, the legal agreements described in this report, in many cases, include complex concepts that cannot be completely described in a summary manner. In the event of any inconsistency between the description of the terms and conditions in this report and those in the legal agreements, the terms of the relevant legal agreement are intended to prevail.

In respect of any legal agreement which has not yet been executed and delivered by the parties thereto, it should be noted that:

- This report sets out the anticipated terms and conditions of such legal agreements;
- Where the terms and conditions of a legal agreement are the subject of on-going negotiations, when agreed upon, they will be as set out in the finalized, executed and delivered version of such legal agreement; and,
- The City's rights and obligations in respect of such legal agreements do not come into effect until they are finalized, executed and delivered.

The description of legal agreements in this report is not exhaustive. It is anticipated that ancillary legal agreements, and other instruments, will be required in order to complete the transactions and matters contemplated in this report.

The approval of the recommendations contained in this Report will provide staff with the necessary direction and delegated authority to finalize and execute all such legal agreements, and other instruments, for the various elements of the Stage 2 extension of the Confederation Line and Trillium Line Light Rail Services.

The finalization and execution of the legal agreements, and other instruments, as recommended in the Report, is as contemplated by, and in keeping with, the procurement processes and transactions approved by Council in March 2017 by approval of the Report to Council titled the *Stage 2 Light Rail Transit Implementation Report – Project Definition and Procurement Plan* (ACS2017-TSD-OTP-0001), dated February 24, 2017.

It is important to note that there are a number of approvals and confirmations, which are currently in progress, that are required from the Canada Transportation Agency,

Transport Canada and related Federal agencies being monitored, as outlined in this report.

RISK MANAGEMENT IMPLICATIONS

As outlined in report, the City of Ottawa has created an extremely robust risk profile, outlined in the Project Agreements. The risk profile ensures taxpayers are protected from increased project costs, schedule delays and potential complications.

FINANCIAL IMPLICATIONS

Previously Approved Stage 2 LRT Projects

Council previously approved several projects for the Stage 2 Ottawa Light Rail Transit OLRT project. In March 2017, Council approved the RTG MOU for additional vehicles and the Belfast MSF Expansion for $492 million, as part of the Stage 2 Report (ACS2017-TSD-OTP-0001). An additional $178 million of Stage 2 preliminary planning and procurement cost budgets were also approved by Council as part of the annual budget approval process starting in 2015 to 2018. Funding sources were identified for both of these projects, including two-thirds funding from the federal and provincial government.

In May 2016, the City applied to the federal Public Transit Infrastructure Fund (PTIF) to use its funding allocation toward a number of Stage 2-related projects. In August 2016, the federal government announced that it would fund these initial, enabling works for the Stage 2 LRT project for a total of $66.35 million:

- $45,000,000 for Stage 2 LRT early works and preliminary engineering;
- $20,000,000 for the acquisition of two train sets (four light rail vehicles) to provide additional capacity on the O-Train Confederation Line;
- $1,250,000 for the design of a bridge to grade separate the VIA Rail Canada line and the O-Train Trillium Line at the Elwood Diamond; and,
- $100,000 for consultation with indigenous communities.

The recommended budgets and funding sources for all capital requirements of Stage 2 are described in the following section, including any previously approved projects. Upon adoption of this report any pre-established budgets and funding sources will be realigned to reflect the updated project budgets.

Stage 2 LRT Project Budget – Construction Period

As described earlier, the procurement for Stage 2 included a Memorandum of Understanding (MOU) with RTG to maintain the Confederation Line extension until 2048; a design, build, finance, maintain (DBFM) model for Trillium Line with substantial completion in 2022; and, a design, build, finance (DBf) model for Confederation Line with substantial completion for the eastern extension in 2024 and the western extension in 2025.

Trillium Line Extension Project

The total capital costs for the Trillium Line project is $663 million in construction period payments (CPP), plus $36.6 million in Equity Class A deferred capital and $99.7 million in Equity Class B deferred capital for a total of $799.3 million.

TNEXT will finance the initial 10 per cent of the project's capital costs through commercial financing sources with no payments to be made by the City up to the point in time at which the 10 per cent threshold is achieved. Thereafter, payments shall be made by the City on a monthly basis with each payment amount being set based on the construction progress completed in the relevant month. Payments from the City shall be sized to cover 85 per cent of the private partner's funding requirement for the month, with the remaining 15 per cent to be financed by the private partner through additional commercial construction-period financing.

A bullet payment will be made by the City upon substantial completion of construction. This payment will cover a portion of the aggregate amount of construction-period financing raised by TNEXT throughout construction, while leaving an amount of private capital ($136.2 million) outstanding to be repaid in the maintenance period.

In addition to the construction period payment regime noted above, the City will also be paying costs incurred by TNEXT under the revenue vehicle supply contract with Stadler for the supply, delivery and commissioning of incremental diesel rolling stock. Payments under the revenue vehicle supply contract are based on different milestones tied to progress. The value of this contract is $106.6 million and is included in the total price for Trillium Line of $799.3 million.

The private long-term capital financing is to be repaid by the City over the initial four 4-years of the maintenance term for the Class B Equity and over the entire 27-year maintenance term for the Class A Equity. The weighted average cost of capital associated with the obligation is 11.90 per cent. This long-term capital financing structure of all-equity was designed by the City to ensure flexibility throughout the contract term, in the event that significant changes are required for the project, such as a system extension. This is in contrast to the Stage 1 financing structure that included long-term debt, in which lenders had consent rights that constrained the City's ability to undertake a system extension and required the City to step in as long-term lender. In order not to lose the oversight that long-term lenders bring to the project, the City has ensured that the Project Agreement incorporates measures to ensure sufficient performance security is available to the City and that the long-term capital financing drives risk transfer throughout the maintenance term.

It should be noted that the private partner's financing shall be subject to an interest rate reset at commercial close. Accordingly, the total amount of payments to be made by the City throughout the construction period shall be adjusted based on the final financing cost to be set upon commercial close.

Confederation Line Extension Project

The Confederation Line Extension Project is being delivered as a Design-Build-Finance (DBf) project at a cost of $2.571 billion with no maintenance component since the City's contract with the Rideau Transit Group (RTG) shall be amended for the latter to undertake maintenance on the expanded Confederation Line as the extensions become operational. The Confederation Line Extension Project, therefore, does not include any long-term capital financing by the private contractor. Under the Project Agreement for this project the entire capital cost shall be paid by the end of the construction period.

Payment shall be made by the City on a monthly basis with each payment amount being set, based on the construction progress completed in the relevant month. This is considered an earned-value model, as described previously in this report. Payments from the City shall be sized to cover 90 per cent of the private contractor's funding requirement for the month, with the remaining 10 per cent to be financed by the private contractor through commercial construction-period financing. The aggregate amount of such construction-period financing will be repaid by the City to the private contractor through two separate payments, one upon achievement of substantial completion on the east extension and another upon achievement of substantial completion on the west extension.

Similar to the Trillium Line Extension Project, the private contractor's construction-period financing will be subject to an interest rate reset at commercial close and the total payment obligation of the City shall be adjusted accordingly.

In addition to the construction period payment regime noted above, the City shall also be paying costs incurred by the contractor for work items being implemented through a cash allowance mechanism. This applies to work they perform on our behalf, such as utility works and art work and then billed separately. The cost for these is included in the City Costs.

There is also an additional subcontract of $70 million, based on a "no greater than price" for the Thales Confederation Line signalling system. The Thales subcontract value will be paid on a milestone basis as certified by the Independent Certifier and not on an earned value basis like the remainder of the Confederation Line private contractor works.

City Costs (Non-Contract Costs)

The total estimated cost for non-contract City costs is $645.8 million and includes all the costs of preliminary planning, procurement, construction oversight and implementation. A contingency of $150 million is also included in these costs. The following table summarizes the total capital cost and funding authority requirement for Stage 2 LRT, including previously approved projects for preliminary planning and procurement and the RTG MOU:

Table 11 – Total Project Budget for Stage 2 LRT

Project Costs	Total Stage 2 Capital Cost $Million
Confederation Line Extensions	$ 2,571,077,095
Trillium line Extension	$ 663,050,000
Trillium Line Additional Equity	$ 136,239,176
Thales	$ 70,000,000
City Costs (non-contract work)	
Procurement, Planning, Construction	$ 273,800,000
Implementation Costs	$ 221,945,000
Contingency	$ 150,000,000
RTG MOU (Vehicles and MSF Expansion)	$ 492,000,000
Non-refundable HST	$ 79,333,958
Total	**$ 4,657,445,229**

The recommended project budget is $4.657 billion. The sources of funding for the $4.657 billion project budget will consist of $2.366 billion from Federal and Provincial grant funding contributions, $35 million in external funding for some of the bundled projects and the remaining $2.256 billion net cost will be funded by the City from various revenue sources.

These revenue sources include development charge revenues, Provincial and Federal gas tax revenues and City revenues that are raised through the transit tax levy for capital works. This project is growth related, and as such, was identified in the 2017 Development Charges Amendment Background Study, at which time, the development charge share of the City's net requirement was increased from 43 per cent to 61 per cent.

The City currently receives approximately $91 million each year in combined gas tax revenues ($34 million Provincial / $57 million Federal) that are dedicated to transit. The affordability model assumes that the provincial portion will double over the next four years per the commitment made by the previous government.

The City currently contributes approximately $75 million per year, in funds generated through transit taxes, to the transit capital program. These revenue sources will be used to fund the Stage 2 LRT project and will also fund the other capital and operating expenditures included in the Transit Long Range Financial Plan.

Due to the increase in the estimated Stage 2 LRT project costs, along with other changes in economic factors, the Transit Affordability Model was updated to assess the continued overall affordability and sustainability of the Transit LRFP. The results of that assessment are detailed in the companion report to this Stage 2 LRT report, titled

Transit Long Range Financial Plan Update (ACS20198-CSD-FIN-0003). The update concludes that Stage 2 of the Light Rail program is affordable.

Recommended Stage 2 LRT Project Budget Funding Sources

The following table summarizes the $4.657 billion Stage 2 LRT project budget and its funding sources and identifies the resulting cash flow. Council has approved $672.5 million in previous capital budgets to fund preliminary engineering, procurement costs and the RTG MOU, which are included in the $4.657 billion project authority. Given the size and the duration of this project the full project authority will not be allocated to the various reserves (i.e. Transit Capital Reserve, Gas Tax Reserve, Development Charge Reserve) upon project approval but rather allocated on a year by year basis. This will assist in cash flow management and reserve fund forecasting.

Table 12 - Recommended Stage 2 LRT Funding Sources

	Total $M	2016/17 $M	2018 $M	2019 $M	2020 $M	2021 $M	2022 $M	2023 $M	2024 $M	2025-2048 $M
Project Costs										
Contract Costs	**(3,796)**	(190)	(117)	(497)	(636)	(707)	(674)	(356)	(173)	(446)
Non-Contract City Costs	**(646)**	(80)	(85)	(124)	(93)	(84)	(59)	(47)	(44)	(30)
Private Deferred Capital	**(136)**	-	-	-	-	-	(1)	(13)	(22)	(100)
Non-refundable HST	**(79)**	(4)	(4)	(10)	(13)	(14)	(13)	(7)	(4)	(10)
Total Uses	**($4,657)**	**($274)**	**($206)**	**($631)**	**($742)**	**($805)**	**($747)**	**($423)**	**($243)**	**($586)**
Funding Sources										
Federal Grant	1,158	98	71	206	252	276	255	-	-	-
Provincial Grant	1,208	99	85	221	256	243	260	44	-	-
Other Revenue	35	-	-	-	9	9	9	8	-	-
Fed Gas Tax Cash	185	6	4	12	15	16	16	44	26	46
Fed Gas Tax Debt	281	9	6	19	23	25	25	66	39	69
Prov Gas Tax Cash	197	4	3	8	10	11	14	37	24	86
Prov Gas Tax Debt	281	6	4	12	15	16	19	49	30	130
Transit Tax Debt	288	-	-	-	-	-	-	-	38	250
DC Cash	194	6	6	28	31	33	31	37	22	-
DC Debt	771	46	27	125	116	161	103	124	64	5
*Bundled Projects (Non-Transit):										
City Wide Tax	35	-	-	-	9	9	9	8	-	-
Rate	20	-	-	-	5	5	5	5	-	-
Non Transit Revenue	4	-	-	-	1	1	1	1	-	-
Total Sources	**$4,657**	**$274**	**$206**	**$631**	**$742**	**$805**	**$747**	**$423**	**$243**	**$586**

* Bundled projects include non-transit projects that will be funded from sources other than transit.

As the project construction will be undertaken over a six and half year period, and revenues from the sources identified above will flow to the City during that time period, debt authority is being requested in the absence of sufficient transit, gas tax and development charge cash reserves at project initiation. As cash is received from transit taxes, development charges and gas taxes, the debt authority may be reduced. $576 million of the $2.256 billion City funding requirement is funded by cash, $1.621 funded

by debt and the remaining $59 million for non-transit bundled projects will be funded by city wide tax, rate and revenue from projects that were previously approved or planned and will now be bundled with the Confederation Line and Trillium Line Extension Projects. As the $136.2 million of equity on Trillium provided by the proponent is indirect debt that will be repaid with interest over the 27-year maintenance and service period, it is also identified as required debt authority and included in the total above. Development charge revenue and Provincial / Federal gas tax revenues, will be used to service the principal and interest on this indirect debt over the 27-year maintenance and service period. The interest charged on the $136.2 million is approximately $107.2 million for a total debt service cost of 243.4 million for private debt.

OLRT Operating and Maintenance Costs

Trillium Line Extension Project

Under the Project Agreement, the City will be required to enter into long-term commitments for a monthly availability service payment (ASP) tied to performance throughout the 27-year maintenance term. This payment will include the repayment of the long-term private sector financing component, as well as payments to cover maintenance and lifecycle requirements. The following table summarizes those long-term commitments that will be paid through the monthly ASP. Lifecycle costs and a portion of the maintenance cost payments will be adjusted for inflation over the 27-year period. The project agreement will stipulate the inflation rate indices to be used.

Table 13 - Trillium ASP Breakdown for 27 Years

Cost Component	Nominal Total ($M)	Net Present Value* ($M)
Maintenance**	$ 447	$ 224
Lifecycle**	$ 234	$ 124
Insurance and Admin.	$ 27	$ 14

* Amounts are discounted to 2018 at 4.0%, with the exception of the long-term capital component which is discounted at the effective Weighed Average Cost of Capital to the date at which the Substantial Completion Payment is made.

** Amounts based on Service Level 1 (i.e. the base Service Level for system operations).

Confederation Line Extension Project

The Confederation Line Extension Project is being delivered as a Design-Build-Finance (DBf) project with no maintenance component since the City's contract with the Rideau Transit Group (RTG) will have the latter to undertake maintenance on the expanded Confederation Line as the extensions become operational. Similar to the Trillium maintenance contract, the City will enter into long-term commitments for a monthly availability service payment (ASP) tied to performance throughout the 30-year maintenance term for the combined Stage 1 and 2 system. This payment will include the repayment of the long-term private sector financing component from Stage 1, as well as payments to cover maintenance and lifecycle requirements for both Stage 1 and 2. The following table summarizes those long-term commitments that will be paid through the monthly ASP for Confederation Line:

Table 14 - Confederation Line ASP Breakdown for 30 Years (Stage 1 and 2)

Cost Component	Nominal Total ($M)	Net Present Value* ($M)
Maintenance**	$ 2,810	$ 1,414
Lifecycle**	$ 987	$ 449
Insurance and Admin.	$ 244	$ 128
Private Deferred Capital	$ 692	$ 397

* Amounts are discounted to 2018 at 4.0%, with the exception of the long-term capital component which is discounted at the effective Weighed Average Cost of Capital to the date at which the Substantial Completion Payment is made.

** Amounts based on Service Level 1 (i.e. the base Service Level for system operations)

In addition, a portion of the maintenance and lifecycle costs noted above for Trillium and Confederation Line will vary as transit service levels change (a service level increase beyond Service Level means an earlier commencement of operations in the morning and/or later conclusion of service at night). In the event that transit service levels are increased, ridership should increase, thus offsetting the additional costs with concurrent additional revenues in the form of transit fares.

Annual operating and maintenance costs in the first full year of operation (2026) are expected to be $140.1 million (in 2019 dollars), for Confederation Line (Stage 1 and 2 combined) and Trillium in total and annual bus operating costs are estimated to decrease by $54 million (in 2019 dollars). The City will pay for driver costs and energy costs directly and will reimburse the Proponent through an availability service payment (ASP) for costs associated with maintaining the trains, infrastructure, stations, and the Maintenance and Storage Facility.

Table 15 – Projected Annual Operating and Maintenance Costs in 2026 (Stage 1 and 2 Combined)

Operating and Maintenance Costs	Annual $M (in 2019 $)
Confederation	
Maintenance, SPV and Insurance	$ 79.7
Operator and Power	$ 30.3
Administration	$ 4.0
Trillium Maintenance	
Maintenance, SPV and Insurance	$ 12.4
Operator and Fuel	$ 8.9
Administration	$ 4.8
Total	**$ 140.1**

In order to undertake this long-term arrangement, the proponent will establish a special purpose vehicle (SPV) to oversee the project requirements during the construction and operating phases. This is standard practice in delivering public-private partnership (P3) agreements of this nature. As such, insurance and administrative costs, such as legal and accounting services, are included in the monthly service payments for the term of the maintenance period.

Compliance with Debt and Obligation Policies

The City Treasurer is able to confirm that all long-term debt commitments to be entered into as a result of the recommendations in this report, are in accordance with the City of Ottawa Administration of Capital Financing and Debt Policy. Further, the City's debt and financial obligation limit has been updated in accordance with the Municipal Act requirements and the City will remain well within these provincial limits.

Long Range Financial Plan (Affordability)

As indicated previously, an update to the Transit LRFP is provided as a companion report to this Stage 2 LRT report. The updated affordability model indicates that Stage 2 is affordable. Staff recommend that Council approve the funding for Stage 2 LRT described in this report.

ASSET MANAGEMENT

The recommendations in this report are consistent and supportive of the City's Comprehensive Asset Management (CAM) Program by providing a customer-focused, forward looking, and systematic approach to managing city assets that support service delivery.

The Stage 2 Ottawa Light Rail Transit (LRT) project, as described in this report, commits to providing approved levels of service for present and future customers and communities, in the most effective and efficient way, through the planning, design, construction, acquisition, operation and maintenance, renewal, and disposal of assets.

Stage 2 will see the construction of approximately 44 km of new rail and 24 stations. Many of these new assets, notably along the Confederation Line, will be located within the existing dedicated Transitway or along the OR 174 corridor. The foresight used in the planning of the Transitway for its eventual conversion to rail demonstrated sound asset management planning. While Stage 2 takes on new infrastructure assets, there will also be a reduction in existing assets that were used to support Bus Rapid Transit that will reduce lifecycle investment requirements.

New Municipal Infrastructure (NMI) projects are City infrastructure works that have been bundled into Stage 2 for delivery by the Project Constructors. The City has chosen to bundle the NMI projects in an effort to reduce costs, risk, and stakeholder impacts. The Project Agreements for both Confederation Line and Trillium Line provide a framework with respect to maintenance responsibilities for existing and new infrastructure. Many of these bundled projects allow key existing infrastructure assets to be renewed or

replaced through a competitive and well coordinated process that takes advantage of design and implementation efficiencies found in large P3 projects.

Both Project Agreements provide good value for money to the City, as well as ensuring seamless system integration, operations and maintenance. The result will be a world-class LRT system that provides reliable and comfortable public transit service for customers, on par with other major Canadian municipalities.

As part of the Project Agreements, City is to receive Trillium Line and Confederation Line assets back in a good state of repair at the end of the concession period (2048). Post 2048, it will be the City's responsibility to have in place an asset management plan and identify ongoing investment requirements to continue to sustain the assets required to support the O-Train.

As has taken place through Stage 1 construction, there will need to be continued close coordination between Stage 2 construction and other major City construction projects to reduce impacts to residents. This coordination will continue through the work of the Capital Construction Coordination Committee.

ACCESSIBILITY IMPACTS

The City's Stage 2 LRT Project will follow the City of Ottawa's Accessibility Design Standards (ADS), which represent the City and Provincial best practices, and serve to harmonize requirements set out by the *Accessibility for Ontarians with Disabilities Act* (AODA), Design of Public Spaces Standards (DOPS) and recent Ontario Building Code (OBC) amendments.

As outlined in the report, the vehicles operating on Confederation Line (Alstom) and Trillium Line (Stadler and Alstom) will meet or exceed accessibility standards to ensure all customers receive reliable, safe and comfortable service.

Stations will meet or exceed AODA mobility standards by providing redundant means of movement and connectivity through the uses of elevators and escalators, as well as platforms designed for accessibility.

Station features will include:

- Barrier-free path of travel to entrances of stations;
- Accessible fare gates at each entrance, providing easy access for customers using mobility devices or service animals;
- Tactile wayfinding tiles will trace the accessible route through the fare gates, to elevators, platforms and exits;
- Transecure waiting areas on the train platform will include accessible benches and tactile/Braille signs indicating the direction of service;
- Tactile warning strips and inter-car barriers to keep everyone safely away from the platform edge;
- Audio announcements and visual displays for waiting passengers will precede each train's arrival on the platform and will describe the direction of travel;

- Service alerts will be shown visually on the platform displays and announced audibly on the public-address system; and,
- All wayfinding and safety signage will be provided following the applicable accessibility standards (including type size, tactile signage, and appropriate colour contrast).

ENVIRONMENTAL IMPLICATIONS

As highlighted throughout the report, there are significant environmental benefits to implementing the Stage 2 LRT project. Greenhouse gases (GHGs) and critical air contaminants (CACs), which have direct implications for the overall sustainability of urban growth and direct consequences on the health of residents, will be reduced.

Based on the Business Case, it is estimated that Stage 2 will result in nearly 42 million litres of savings in fuel consumption, and reduce GHG emissions by over 110 thousand tonnes and CACs by over 3,000 tonnes by 2048 annually.

The health benefits associated with reductions in harmful emissions are numerous. Exposure to air pollution from road traffic has been linked to a number of health issues (e.g. heart attack, increased risk of death from respiratory and cardiac conditions).

Transit use is also tied to active modes of transportation; on average those who take public transit will walk a significant portion of their recommended daily activity in a round trip.

Environmental benefits will also include a more efficient and sustainable use of land. It supports land use intensification and more compact urban form, making infrastructure and service provision more cost effective.

TECHNOLOGY IMPLICATIONS

Technological Implications are outlined in the report.

TERM OF COUNCIL PRIORITIES

TM1 – Build a world-class environmentally sustainable light rail transit system.
TM2 – Provide and promote infrastructure to support safe mobility choices.
TM3 – Integrate the rapid transit and transit priority network into the community.
TM5 – Ensure reliable, safe, accessible and affordable transit services.
ES1 – Support an environmentally sustainable Ottawa.
EP2 – Support growth of local economy.

SUPPORTING DOCUMENTATION

Appendix 1 – Real Estate Third-Party Agreements
Appendix 2 – Procurement Evaluation Model
Appendix 3 – Fairness Commissioner Report for Confederation Line
Appendix 4 – Fairness Commissioner Report for Trillium Line
Appendix 5 – Station Descriptions and Technical Overview
Appendix 6 – Construction Methodology, Enabling Works and Safety
Appendix 7 – Traffic and Detours
Appendix 8 – Project Agreement Schedule 32 (PLAA Table) for Trillium Line
Appendix 9 – Project Agreements Schedule 35 (PLAA Table) for Confederation Line

DISPOSITION

Subject to Council approval, staff will implement the recommendations as outlined in this report. As part of the City's commitment to build an affordable project, staff will continue to work with the East-West Connectors and TransitNEXT during the final design process to identify opportunities for savings.

Subject to Council approval, the relevant expropriation by-laws described in this report, and appended in draft form, will be completed and placed on the Council Agenda.

It is anticipated that the amendments to the Official Plan, the Zoning By-law and other legislative requirements outlined in the report will be placed on the appropriate Committee and Council agendas in Q1/Q2 2019.

The General Manager, Transportation Services, will ensure status updates on the project are provided to Committee and Council as warranted and outlined in this report.

The Rail Construction Office, in partnership with East-West Connectors and TransitNEXT will develop a comprehensive communication and stakeholder outreach plan.