Stage 2 Light Rail Transit Project

Technical Briefing

February 22, 2019
BACKGROUND
Stage 2 LRT Evolution

O-Train System / Système de l’O-Train d’Ottawa
- Confederation Line
  - Ligne de la Confédération
- Trillium Line
  - Ligne Trillium
  - Prolongement de la Ligne de la Confédération Est
  - Prolongement de la Ligne de la Confédération Ouest
- Bus Rapid Transit
  - Transport en commun rapide par autobus
Stage 2 LRT Evolution

KM of new rail: 30 km → 44 km
New Stations: 19 → 24
Stage 2 LRT Evolution

70% Ottawa residents within 5km of new rail

77% Ottawa residents within 5km of new rail
## Approved Procurement Model

### Confederation Line East and West Extensions

<table>
<thead>
<tr>
<th>Design-Build-Finance (DBf)</th>
<th>RTG MOU ($492M)</th>
</tr>
</thead>
</table>
| • Confederation Line East Extension  
  • Confederation Line West Extension | • 38 Vehicles  
  • Belfast Yard MSF expansion  
  • Civil, vehicle maintenance and lifecycle |

### Trillium Line Extensions

<table>
<thead>
<tr>
<th>Design-Build-Finance-Maintain (DBFM)</th>
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</thead>
</table>
| • Trillium Line Extension, including Airport Link  
  • Upgrade existing Trillium Line  
  • Maintain existing and expanded Trillium Line |
RTG MOU

Additional Vehicles

- RTG will provide and maintain 38 additional Alstom Citadis vehicles to ensure the expanded Confederation Line operates as a single, uniform service
- Vehicles assembly completion: 2021
RTG MOU

Belfast Yard MSF Expansion

- RTG is expanding the Belfast Yard MSF to accommodate the additional Stage 2 vehicles
- Construction completion: 2019
Applied Lessons Learned

- **Notification penalties** – missed project completion notifications will result in penalties, missed dates where project availability notification has been provided will also result in penalties
- **Cost management** - incorporated Stage 1 contingency costs as part of Stage 2’s base scope
- **Payment mechanism** – adjusted to monthly payments to give greater flexibility to the contractor to manage the schedule
- **Bundled Projects** – incorporated City infrastructure projects during procurement to benefit from full risk transfer and cost and schedule certainty of the P3 contract
- **Mobility Matters** - expanded mobility matters to include pedestrians and cyclists
Procurement Timeline

2017
- March: Council approval of Procurement Approach and RTG MOU ($492M)
- March/April: RFQ Release
- June: Vehicle Variation
- June/July: RFP Release
- September: Belfast Yard Expansion Variation

2018
- November: RFP Close

2019
- February: Recommend Preferred Proponents
- March: Council Approval
- March/April: Commercial and Financial Close
- Q2/Q3: Construction Start
Procurement Results
Preferred Proponent
Confederation Line Extension
Preferred Proponent
Confederation Line Extension

Waterloo Stage 1 LRT
South-Europe-Atlantic High Speed Rail
Lusail LRT
Preferred Proponent
Trillium Line Extension

TransitNEXT

SNC·LAVALIN
Preferred Proponent
Trillium Line Extension

Canada Line

Evergreen Rapid Transit Line

Calgary West LRT
Submission Details
Confederation Line Extension
Design Submission
Westboro Station

Ottawa
Design Submission
Cleary Station
Design Submission
New Orchard Station
Design Submission
Lincoln Fields Station
Design Submission
Queensview Station
Design Submission
Pinecrest Station
Design Submission
Bayshore Station
Design Submission
Bayshore Station
Design Submission
Moodie Station
Design Submission
Moodie LMSF
Design Submission
Moodie LMSF
Design Submission
Iris Station
Design Submission
Iris Station
Design Submission
Baseline Station
Design Submission
Montreal Station
Design Submission
Jeanne d’Arc Station
Design Submission
Jeanne d’Arc Station
Design Submission
Orléans Blvd Station
Design Submission
Orléans Blvd Station
Design Submission
Place d’Orléans Station
Design Submission
Place d’Orléans Station
Design Submission
Trim Station
Design Submission
Trim Station
Construction Submission

• Construction Schedule: Confederation Line West Extension
Construction Submission

- Tunnel construction methodology: cut and cover
Construction Submission

- Construction Schedule: Confederation Line East Extension
• Bus Detours: Confederation Line West Extension  
  – 2022 to 2025
Mobility Submission

- Bus Detour: Confederation Line East Extension
  - 2021/2022 to 2024
Bundled Projects

• Bundled projects included in the Confederation Line Extension scope total $107 million and include works such as:
  – Bridge works (Montreal, Golden Rod, Moodie, Jeanne d’Arc, Algonquin)
  – Greens Creek culvert replacement
  – Watermain, storm and sanitary sewer upgrades
  – Rock and sound walls
  – Trim Park and Ride Expansion
  – Woodroffe Stormwater Management Pond
  – Baseline Station Surface Improvements
  – OR 174 concrete removal (eastbound lanes)
  – Upgrades to intelligent transportation systems
  – Active mobility enhancements outside of LRT scope, including Moodie Bridge
TransitNEXT
Submission Details
Trillium Line Extension
Design Submission
Bayview Station
Design Submission
Bayview Station
Design Submission
Gladstone Station
Design Submission
Walkley Station
Design Submission
Walkley Station
Design Submission
South Keys Station
Design Submission
South Keys Station
Design Submission
Leitrim Station
Design Submission
Bowesville Station
Design Submission
Limebank Station
Design Submission
Limebank Station
Design Submission
Uplands Station
Design Submission
Uplands Station
Design Submission
Airport Station
Existing Trillium Stations

- Existing Trillium Stations will be upgraded with:
  - Platform extensions to accommodate 2-car consists
  - New platform furniture
  - Improved signage, lighting and communications systems
  - Modernization of existing elevator and additional of a new elevator at Carling Station to provide redundancy
Vehicle Submission

• The expanded Trillium Line will include a mixed fleet network:
Construction Submission

Construction Schedule: Trillium Line Extension
Mobility Submission

Trillium Line
Detour via
Route R2 Bus:
2020 - 2022
Bundled Projects

- Bundled projects included in the Trillium Line Extension scope total $67 million and include works such as:
  - Tunnels (Dow’s Lake and Carleton)
  - New pedestrian bridges (Rideau River, Trinity)
  - Ellwood Diamond grade separation
  - Existing Trillium Line station and signal upgrades
  - Alstom vehicle overhaul
System Maintenance

Confederation Line (Tunney’s Pasture to Blair)
Confederation Line East and West Extensions
All Confederation Line Alstom Vehicles

Existing Trillium Line (Bayview to Greenboro)
Trillium Line Extensions
All Trillium Line Vehicles (Alstom and Stadler)
Project Agreements

• Stage 2 includes two Project Agreements, one for Trillium Line Extensions (DBFM), and one for Confederation Line Extensions (DBf).

• Each project agreement:
  – Dictates performance specifications;
  – Determines roles and responsibilities with respect to utilities, geotechnical, permits and approvals;
  – Defines system integration;
  – Defines interface agreement; and
  – Determines payment regime.
Bid Pricing & Schedule
Stage 2 Scope Evolution

• Scope additions to the Trillium Line Extension
  – New Maintenance and Storage Facility (MSF)
  – Upgrades to existing system and takeover of existing alignment assets
  – Seven Stadler vehicles
  – 3.4 km extension to Limebank
  – Bundled projects, including Ellwood Diamond grade separation

• Scope additions to Confederation Line Extensions
  – Bayshore to Moodie extension
  – Moodie Light MSF
  – Bundled projects
  – Additional Washrooms
  – Additional escalators and elevators
Market Cost Drivers

Capital costs for large scale transit projects have been observed in recent projects across Canada, including:

- Increased cost of labour and services;
- Increased cost of materials; and
- Increased cost of risk contingency and schedule
Trillium Line Procurement Results

**Construction Cost**

City Estimate (construction cap) - 2017 Estimate: $488M

TNEXT Bid Price - Bid Price $663M

Scope: + $75M

Maintenance Shift: + $100M

On Budget ($120M under cap)

**Aggregate Cost (maintenance + capital)**

Aggregate Cap - Aggregate Cap: $1.73B

Maintenance Shift: - $100M

$1.61B

On Budget ($120M under cap)
MOU Pricing

• The MOU achieved real savings for the City by extracting efficiencies from RTG:

<table>
<thead>
<tr>
<th>RTG MOU Scope</th>
<th>Savings from the Bid Price to the final Negotiated price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per vehicle</td>
<td>$1M reduction</td>
</tr>
<tr>
<td>Per km vehicle maintenance</td>
<td>7% reduction</td>
</tr>
<tr>
<td>Per km infrastructure maintenance</td>
<td>27% reduction</td>
</tr>
</tbody>
</table>

• Stage 2 MOU pricing, as compared to Stage 1 Confederation Line 2012 maintenance pricing:

<table>
<thead>
<tr>
<th></th>
<th>Variable Cost</th>
<th>Fixed Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 Pricing</td>
<td>$1,143M</td>
<td>$2,281M</td>
<td>$3,424M</td>
</tr>
<tr>
<td>Stage 2 MOU Pricing</td>
<td>$1,059M</td>
<td>$1,662M</td>
<td>$2,721M</td>
</tr>
<tr>
<td>Total Savings to 2048</td>
<td>-</td>
<td>-</td>
<td>$703M</td>
</tr>
</tbody>
</table>
Confederation Line Procurement Results

**Construction Cost**

- City Estimate (construction cap): $1.8B
- EWC Bid Price: $2.57B
- 2017 Estimate: $1.8B
- Construction Cap $1.98B
- Scope
- Affordability

- Bid Price: $2.57B

- $591M Over Cap

**Maintenance Cost**

- City Estimate
  - Shadow Bid (based on Stage 1 price per km): $3.424B

- MOU Price
  - MOU Pricing $2.721B

- $700M in maintenance savings
Stage 2 Scope Increases

• Additional scope with funding
• Additional scope brought on as enhancements with no funding
• Additional capital scope brought on to reduce Trillium Line maintenance costs
Scope Increases: Additions of Project Elements with Funding

• Bundled Projects
  – Total increase: $74M
    • 2017 Estimate: $100M
    • Final Estimate: $174M

• Extension to Limebank
  – 3.4km extension and one additional Stadler vehicle: $80M

Total scope increases with funding: $154M
A number of project enhancements have been added to project scope, totalling $311M, including:

- Extension to Moodie, Moodie Station, Moodie LMSF
- Place d’Orleans Station Bridge and Champlain entrance
- Additional Washrooms (Lincoln Fields, Place d’Orleans)
- Additional escalators (11)
- South Keys north tunnel
- Detour facilities (including 417 ramp work)
- Gladstone Plaza expansion
- Double tracking south of Leitrim to Limebank
- Fully independent alignment for Airport Link
- Double engines for Stadler Vehicles
- OR 174 Stormwater improvements
Scope Increases: Shift from Trillium Maintenance to Capital

- TNEXT opted to perform a more robust overhaul and upgrade of the existing Trillium Line than had been previously contemplated.
- To do this, they had to stay under the aggregate budget for both capital and maintenance.
- By investing an additional $236M upfront, TNEXT’s bid came in under the City’s aggregate budget by $120M.
## Stage 2 Scope and Market Pressures

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2017 Capital Project Costs (HWY 417 works removed)</td>
<td>3,415</td>
</tr>
<tr>
<td><strong>Scope Changes</strong></td>
<td></td>
</tr>
<tr>
<td>• Funded Projects</td>
<td>701</td>
</tr>
<tr>
<td>• Unfunded Enhancements</td>
<td></td>
</tr>
<tr>
<td>• Trillium Front-end Capital investments</td>
<td></td>
</tr>
<tr>
<td><strong>Market Pressures Impacting Price</strong></td>
<td>591</td>
</tr>
<tr>
<td><strong>Cost compression</strong></td>
<td>(50)</td>
</tr>
<tr>
<td><strong>Total Stage 2 Capital Project Costs</strong></td>
<td>4,657</td>
</tr>
</tbody>
</table>
Value for Money

Canadian LRT Projects, Cost per km, estimate
($CAD 000s)

- Ottawa Stage 1 LRT
  12.5 kms - 13 stations - Contract Award 2012
- Eglinton Crosstown LRT
  19 kms - 25 stations - Contract Award 2015
- Montreal's REM
  67 kms - 26 stations - Contract Award 2018
- Finch West LRT
  11 kms - 18 stations - Contract Award 2018
- Ottawa Stage 2 LRT
  44 kms - 24 stations - Contract Award 2019
Funding
## Stage 2 Budget Funding

<table>
<thead>
<tr>
<th></th>
<th>Cash (M)</th>
<th>Debt (M)</th>
<th>Other (Tax, Rate, PTIF) (M)</th>
<th>Total (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal and Provincial Grants</td>
<td>2,366</td>
<td></td>
<td></td>
<td>2,366</td>
</tr>
<tr>
<td>Other Revenue</td>
<td>35</td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Gas Taxes</td>
<td>382</td>
<td>562</td>
<td></td>
<td>944</td>
</tr>
<tr>
<td>Development Charges</td>
<td>194</td>
<td>771</td>
<td></td>
<td>965</td>
</tr>
<tr>
<td>Transit taxes</td>
<td></td>
<td>288</td>
<td></td>
<td>288</td>
</tr>
<tr>
<td>Non-Transit Funding (Bundled Projects)</td>
<td></td>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,977</strong></td>
<td><strong>1,621</strong></td>
<td><strong>59</strong></td>
<td><strong>4,657</strong></td>
</tr>
</tbody>
</table>
Long Range Financial Plan (LRFP) Transit Update
Updates to the 2017 LRFP

• Changes in Revenue
  – Transit Tax increased to 3%
  – Maintain fare increases at 2.5%
  – Assessment growth increased to 1.5%
  – Reduction in fare revenue due to fare erosion
  – Assume 100% senior level government funding for Stage 3

• Changes in Operating Costs
  – Increases to fuel costs, station energy costs, Faregate costs
  – Reductions in the maintenance price for the Trillium Extension
Updates to the 2017 LRFP

• Changes in Capital Costs
  – Increased scope of Stage 2 plus market conditions increase the overall cost by $1.2 Billion

• Based on these assumptions the Transit LRFP is affordable

• Debt servicing within Provincial limit
Schedule
### Schedule Submission

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Start (Confederation and Trillium Lines)</td>
<td>2019</td>
</tr>
<tr>
<td>Trillium Line Construction Completion</td>
<td>2022</td>
</tr>
<tr>
<td>Confederation Line East Construction Completion</td>
<td>2024</td>
</tr>
<tr>
<td>Confederation Line West Construction Completion</td>
<td>2025</td>
</tr>
</tbody>
</table>
O-Train Network

• When Stage 2 is complete, the City’s overall O-Train network will include:
  – 64 km of fully grade separated rail
  – 41 stations
  – 85 vehicles
  – 3 maintenance and storage facilities
Next Steps
## Next Steps

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff report will rise to Committee</td>
<td>February 27</td>
</tr>
<tr>
<td>Staff report will rise to Council</td>
<td>March 6</td>
</tr>
<tr>
<td>Financial and Commercial Close</td>
<td>March/April</td>
</tr>
<tr>
<td>Construction commences</td>
<td>2019</td>
</tr>
</tbody>
</table>
Questions?