

## **Appendix 6**

### **Construction Methodology**

#### Trillium Line

The proposed construction methodology and schedule is focused on initiating works on the southern extension and airport link as soon as possible while leaving the Trillium Line in operation as long as possible prior to the shutdown planned in May 2020.

Preliminary work, such as tree clearing, utility relocations and geo-technical investigations, will start immediately and followed quickly by foundations for grade separations and subsequent work on the structures, guideway and stations on the southern extension. Rail-over-road grade separations are proposed for Lester Road, Leitrim Road, Earl Armstrong Road and Bowesville Road, which will be less disruptive to traffic during construction than building road-over-rail grade separations.

A test track will be constructed between Bowesville Station and Limebank Station to facilitate system and vehicle testing and commissioning in advance of works being completed on the existing Trillium Line. As the new Walkley Yard will be constructed on vacant City lands adjacent to the existing Walkley Yard facility, construction of the new facility will be able to commence well before the shutdown period and is expected to be completed sufficiently in time to receive the new vehicle fleet from Stadler in 2021.

Construction of grade separations, structural rehabilitations, stations and systems on the existing portion of the line will not commence in earnest until the commencement of the shutdown period to avoid the inefficiency and disruptions associated with working on and around an existing operating railway.

Civil and structural guideway and station work at Airport Station will be complete by the end of 2020 to allow the Airport Authority sufficient time to construct their Terminal Building expansion, which will serve as the Airport Station concourse prior to revenue service availability of the expanded Trillium Line and Airport Link in 2022.

#### Confederation Line

The proposed construction methodology and schedule is focused on initiating works in late 2019 at Montreal Road and Lincoln Fields areas together, with beginning utility relocations throughout the entire project length. Work on the Sir John A. Macdonald (SJAM) Parkway tunnel is expected to begin early in 2020 together with work on the new bridge structures required for the project. Critical components of the work that will drive schedule include Montreal Road bridges and roadway work, the SJAM Parkway tunnel, Richmond Road, and various bridge structures.

As with Trillium Line Extension Project, there are clear restrictions on where the work can take place and which areas are permitted for use. The Project Agreement defines the

land that is available for the work and work is not permitted outside of these areas. Certain areas are defined for permanent work and others are available for construction staging on a temporary basis.

### *Underground Structure Construction Methodology*

EWC's construction methodology takes into account and addresses all key elements, including project objectives, stakeholders' needs, management of traffic constraints, risks, and quality of the delivered product.

The Confederation Line Extension includes three underground structures, which will be constructed through the following methodologies:

1. Parkway Tunnel will be a cut and cover tunnel that runs under Richmond Road and the NCC lands in SJAM Parkway, with a total buried length of approximately three kilometres. New Orchard and Cleary stations will be located in this tunnel.
2. Connaught Tunnel will be a cut and cover tunnel under Connaught Avenue with a total buried length of approximately 270 metres.
3. There will be an open cut section with a length of 200 metres between the Connaught Tunnel and Pinecrest Station. This structure consists of a concrete U-trench. Queensview Station will be located in the open trench and the open trench will continue through the Pinecrest Road interchange. At Pinecrest Station, the alignment will be at the grade of the existing West Transitway.

*Figure 1: Location of underground structures along the Confederation Line East extension alignment and elevated guideway.*



Tunnel construction will be performed using a cut and cover methodology. Cut and cover construction involves shifting of traffic to phase the works to maintain traffic and pedestrian flow. Excavation for tunnels will start at the surface with the removal of materials from the area of the proposed tunnel and the sides of the excavation will be supported as the required depth is achieved. Once excavation and construction of the concrete tunnel structure is complete, backfill and restoration of the surface will begin.

This sequence will move along the tunnel limit as construction progresses so that the entire tunnel length is not open at the same time. The tunnel construction along the SJAM Parkway is expected to last 18 months and the Connaught Tunnel for 12 months.

The construction will include an analysis for the expected noise levels during construction and mitigation measures will be used in areas where required based on this analysis prior to starting operations.

There will be a need to remove rock during the construction. The primary method for rock excavation is to use hydraulic hammers mounted on hydraulic excavators. Alternate methods such as blasting may be used depending on rock breaking productions using hydraulic hammers. The Project Agreement allows for the use of blasting for rock removal in specific areas where impacts to the surroundings are expected to be minimal.

The construction methodology was developed to reduce and mitigate risks involved with construction activities including adverse impacts to the community, traffic and transit, and the environment. Mobilization sites, staging locations, work areas, and haul routes will be finalized with careful consideration of mobility constraints and impacts and designed to reduce the impact on nearby residences and businesses.

Site investigations will provide information necessary in confirming the construction execution plan. The first construction activity will be to install a perimeter fence for the zone and establish a secure entrance. Adequate signage will be installed to ensure the general public's safety when close to the zones. The soil will be stripped in each zone within the limits of the alignment, laydown areas, and areas that will be used for access roads. The current plan is to build an access road along the entire alignment of the tunnels where possible, allowing EWC to complete the excavation without installing any temporary decking.

Every step of the construction will follow the procedures needed to ensure that works occur in a safe environment. Those procedures will define operating conditions, controls, and the way in which those controls are implemented.

For water management, EWC will use Best Management Practices to provide a dewatering system designed to reduce the amount of water requiring handling and treatment by intercepting and diverting water before it enters construction areas. This approach reduces the potential for construction activities to effect the water. A series of berms and sumps will be installed along seepage points and the perimeter of the

excavation to collect and discharge “clean” water directly to storm and /or sanitary sewer, provided it meets the required MOECC criteria.

A member of the environmental team will perform field sampling and testing for turbidity, pH, and presence of hydrocarbons if contamination is suspected. Water within the construction area not meeting criteria will be directed to a treatment system located at the site.

### Guideway, Stations and Civil Work

Another major construction activity involves the construction of guideway, stations and civil work and this will continue throughout the project duration until testing and commissioning of the system. The installation of the systems required to run the LRT will be later in the project schedule and will run until completion. Testing and commissioning will be conducted after the completion of the major construction activities (2023 for the east and 2024 for the west) with overall completion of the project expected in 2025.

Coordination with key stakeholders is required to enable scheduling of portions of the work that impact Third Parties and other stakeholders. Key consideration is given in the scheduling for the acquisition of property, permits and approvals and material procurement.

### Enabling Works

As previously mentioned, in order to assist the recommended preferred proponents in achieving as efficient a Stage 2 construction schedule as possible, the City has undertaken early enabling works that are independent of project design to allow the successful proponent to optimize their construction schedule.

To date these works have included Byron Linear Park tree relocation, utility relocations near Montreal Road, fibre optic cable relocation along the Osgoode Trail and tree removal near Leitrim Park and Ride. Additional tree removals are also required along the Airport Link of Trillium Line in advance of construction later this year.

The Stage 2 project team will continue to work with Councillors to advise where early works are underway and provide public notification as appropriate.

### Construction Safety and Emergency Management

The health and safety of the public, as well as the protection of property and the environment are key priorities during construction, operations and maintenance of the O-Train Network.

The safety of employees, contractors and other authorized personnel on-site during construction will be covered by the Proponent Team’s Construction Safety Plans, which will include safe working practices, proper traffic management and control and, special conditions such as working at heights, in constrained spaces and the powering of

electrical equipment. All construction areas will be securely fenced and patrolled by EWC and TNEXT to prevent unauthorized public entry.

Continuous inspection and monitoring by the Rail Construction Program's dedicated Construction Management Branch will validate compliance with the Construction Safety Plans and Occupational Safety and Health Administration (OSHA) legislation. In addition to monthly Joint Occupational Health and Safety Committee inspections, supervisory and safety personnel will conduct daily inspections concerning: general site conditions; tools; materials and processes; equipment; area-specific inspections (e.g. site containment, public and motorist safety, project security, fire safety); work-area specific issues (e.g. excavations, tunnel works, elevated works); and, personal protective equipment inspections of on-site workers.

Rail Construction Program staff has reviewed and updated its service area Emergency Management Plan to reflect Lessons Learned during construction of the Confederation Line. The City of Ottawa Emergency Responder Light Rapid Transit Application (CORA) developed in-house as part of Stage 1 will be put into action and updated as needed to meet the requirements of emergency service providers. Staff will continue to coordinate internal emergency management training and exercises in collaboration with the City's Office of Emergency Management.