# DOWNTOWN OTTAWA TRANSIT TUNNEL:

## Tunney's Pasture to Blair Station via a Downtown LRT Tunnel

RECOMMENDED PLAN

Ottawa

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TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

December 2009

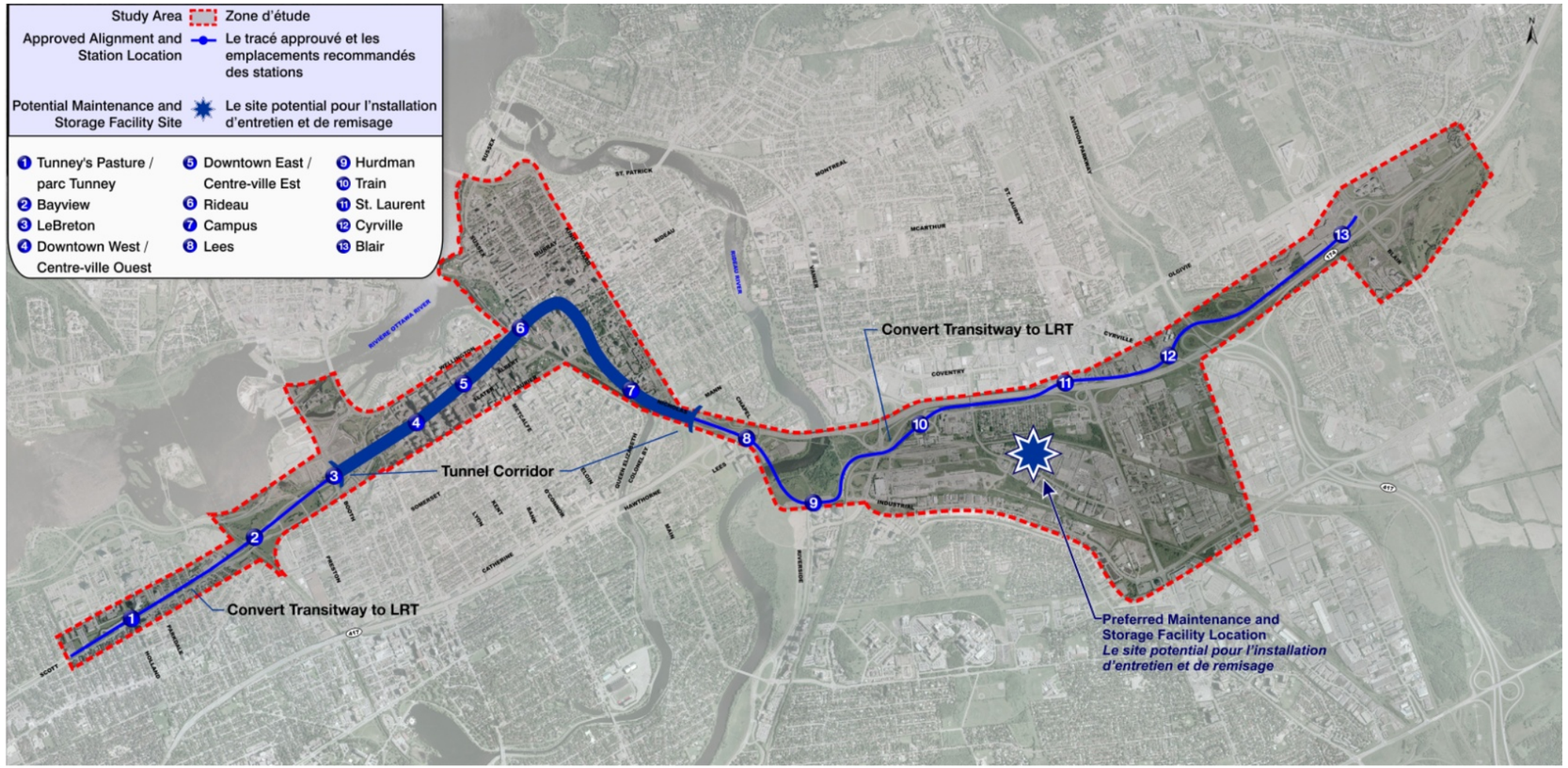
# RECOMMENDED PLAN

This document describes the design, construction and operation of the Downtown Ottawa Transit Tunnel (DOTT) project. The project includes 12.5 km of new electric light rail transit (LRT) running from Tunney's Pasture to Blair via a downtown transit tunnel. Thirteen stations are proposed, four of which are in the 3.2 km tunnel, while the remainder are situated along the above-grade corridor which generally follows the existing Transitway.

To support operation of the line, a Maintenance and Storage Facility will be required to: House the new light rail vehicles (LRVs) which will run on the line; maintain the LRVs running on the line, and on future extensions to the City's LRT network, and; provide maintenance, signalling, communication and control facilities needed for safe and efficient operation of the line and the City's entire planned LRT network.

*Sections include:*

Overview of the Recommended Plan
Implementation
Operation
Project Cost



## Overview of the Recommended Plan

### *LRT Alignment*

The recommended alignment and station locations basically follow the conceptual alignment approved by Ottawa City Council in May 2009. The refinements to the design, which arose during the functional design process, are described herein. Notable changes are in the area of Bayview, Rideau and Hurdman stations, where refinements have been made to address local issues, improve constructability and respond to the need to maintain service during construction. The alignment is illustrated in greater detail in the functional design drawings accompanying this report, and outlined below.

#### *West Transitway Conversion*

Beginning at Tunney's Pasture Station in the west, the proposed LRT alignment follows the existing BRT alignment in a below-grade trench east towards Bayview Station. East of Carruthers Avenue, the trench ends, with the existing Transitway rising onto an elevated fill structure and an overpass at Bayview Road. East of Bayview Road, the LRT alignment shifts slightly north of the existing Transitway alignment and enters Bayview Station, which will be a three level station accommodating the DOTT tracks on the upper level, an intermediate mezzanine, and a lower level accommodating platforms for a future North-South LRT alignment and potentially an interprovincial transit connection via the Prince of Wales Bridge. To the east of Bayview Station the LRT alignment slopes downwards to cross under a new extension of Preston Street and reconstructed Booth Street bridge. The alignment through this area is situated within a corridor defined as part of a previous agreement between the National Capital Commission (NCC) and City of Ottawa to accommodate LRT through the NCC's LeBreton Flats development lands. East of Booth Street, the LRT alignment curves north and then east and enters into the downtown transit tunnel.

#### Downtown Transit Tunnel

##### *Horizontal Alignment*

The proposed downtown transit tunnel spans roughly 3.2 km from east of Booth Street to south of Mann Avenue. The tunnel route follows a "cross-country" alignment which enters the downtown under Albert Street, with the Downtown West station in the Lyon/Bay block. The alignment then turns slightly to the north at Bank Street to cross under Queen Street at O'Connor, with the Downtown East Station centered between Bank Street and O'Connor. The alignment then continues cross-country toward Rideau Street, passing under the Confederation Square area, with a Rideau Station spanning under the Rideau Canal to the area of the Rideau Centre. A curve to the south takes the alignment under Rideau and Waller Streets where the existing Transitway corridor is reached at the east end of the Mackenzie-King Bridge. Following under the existing Transitway corridor to a point south of Laurier Avenue, the alignment crosses under Nicholas Street and follows Colonel By Drive, with Campus Station located in the vicinity of the Corktown Footbridge. South of Campus Station, the alignment curves back under Nicholas Street to regain the existing Transitway alignment at the south end of the university campus. The east tunnel portal would be located south of this location, between Mann Avenue and Lees Station.

##### *Vertical Alignment*

The vertical alignment of the tunnel must be deep enough to permit the safe construction of the tunnel and stations by avoiding impacts to building foundations, utilities and the Rideau Canal. Given existing available data on rock characteristics at tunnel depths, and the fact that the horizontal alignment of the tunnel passes under some significant existing buildings downtown, conservative estimates of the structural clearances required to construct underground tunnels and station caverns have been applied, resulting in a deeper vertical alignment than originally anticipated. Additional investigation during the preliminary engineering phase will provide more data on subsurface conditions including detailed information on rock and soil characteristics, faults and ground water movement along the route of the tunnel. Any changes to the vertical alignment or, construction methods proposed will be based on the results of this investigation.

After entering the tunnel through the west portal the LRT alignment descends to a depth of 38 m below grade before reaching the Downtown West Station. The tunnel continues to descend, reaching a low point of 44 m below grade, before rising slightly to the Downtown East Station.

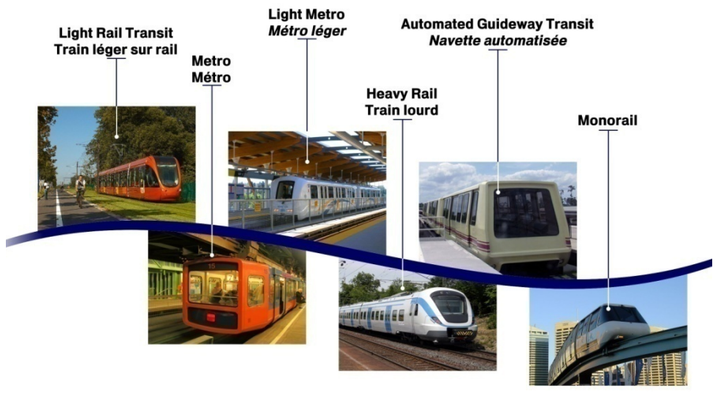
The tunnel then maintains a relatively flat grade between Downtown East and Rideau Station, located approximately 30 m below grade. The tunnel then begins to climb back towards grade, reaching a level of 16 m below grade at Campus Station. A slight dip south of Campus will be required to avoid utilities and tunnel under Mann Avenue, before the West Portal is reached between Mann Avenue and Lees Station.

### *East Transitway Conversion*

After exiting the tunnel, the LRT alignment again follows the existing Transitway corridor, through Lees Station and over the existing Rideau River Bridge to Hurdman Station. The LRT alignment through Hurdman Station is located to the north of the existing BRT platforms, and once again rejoins the existing Transitway alignment east of Hurdman Station to cross over Riverside Drive on the existing Transitway overpass. Through Train Station, the existing Transitway corridor is followed, with the alignment straightened to the north of the existing BRT platforms. East of Train Station, the LRT alignment once again follows the existing Transitway alignment through St. Laurent and Cyrville Stations to its terminus at Blair Station, 12.5 km to the east of Tunney's Pasture.

## *Vehicle Technology*

The DOTT project will use Light Rail Transit technology. While the exact vehicle specifications differ by manufacturer, and will be subject to a procurement process to be initiated by the City of Ottawa, the typical Light Rail Vehicle (LRV) that will be used has a length of approximately 30 m and a width of 2.65 m. Passenger capacity is up to 200 per car, although for service planning purposes a capacity of 150 per LRV is generally assumed. The line has been planned and designed to accommodate 6-car (180 m) trains, although it is likely that operation will commence using 3 or 4-car trains (90 and 120 m respectively). The trains are powered by electricity, which will be supplied via an Overhead Conductor System (OCS).




While the exact specifications of the power distribution and supply system will be determined during the next phase of design, most modern LRT systems operate with an electrical current of 600-750 volts (DC). The previous N-S LRT project proposed using 1500 volts (AC).

A separate report has been approved by the City recommending a fully automated system using communications-based train control (CBTC) to regulate the movement of trains along the line. The trains will be capable of operating with or without an on-board staff member to open/close vehicle doors at station stops and otherwise assist with passenger safety and security. The use of automated operations allows for reduced headways between trains, which will be important to improve capacity and efficiency in the downtown. The availability of an on-board staff person would also allow for manual operation in the more suburban portions of the network when the line is extended in the future.

## *Horizontal and Vertical Alignment Parameters*

Design parameters created for the LRT alignment are based on those used in other LRT systems (e.g. Edmonton, Toronto, Charlotte) and current industry best practices. The design parameters have been developed to accommodate a wide range of Light Rail Vehicle (LRV) models currently on the market.

The minimum and maximum design parameters used to develop the horizontal and vertical alignment are outlined below.

### *Horizontal and Vertical Alignment Design Parameters*

| Design Feature | Minimum/Maximum Design Parameter |
|---|---|
| Track Gauge | 1435 mm (standard gauge) |
| Horizontal Curves (revenue tracks) | 425 m for 80 km/hr operation desirable minimum; 150 m minimum for ride comfort; 75 m absolute minimum |
| Horizontal Curves (non-revenue tracks) | 15 m |
| Station Platform Length | 120 m (operation) 180 m (protected) |
| Minimum distance from end of platform to curve or special trackwork | 10 m |
| Minimum distance between tracks on tangent (centre to centre) | 4.5 m minimum on tangent track with centre OCS pole; Minimum track separation on curves is increased by 3.5 times the superelevation. |
| Maximum grade (running section) | 3.5% desired maximum, with 5.0% absolute maximum for short stretches |
| Maximum grade (through station) | 1.5% |
| Minimum grade (through station) | 0.3% (for drainage) |
| Maximum vertical curve | 250 m for crest, 350 m for sag |
| Minimum vertical clearance | 4.5 m |

More detailed design guidelines will need to be developed at the preliminary design stage. Sight lines for signalling will be confirmed during subsequent design phases of the DOTT project.

### *Refinements to the Alignment*

The alignment illustrated in this Recommended Plan is preliminary in nature. Refinements in the horizontal

and/or vertical alignment will continue in subsequent stages of design in order to:

- Improve operating characteristics
- Reduce future maintenance requirements
- Minimize construction related impacts
- Reduce capital and operating costs
- Minimize impacts to adjacent properties

Refinements to the recommended alignment will be subject to the commitments and amending procedures to be outlined in the Environmental Assessment report for the DOTT project.

## Ancillary Features

### Special Trackwork

Special trackwork is required at key locations along the LRT alignment to support operation of the line. The location of special trackwork facilities was determined based on LRT operational requirements and includes:

- Provision of tail-tracks west of Tunney's Pasture Station to allow full operating speed into the station as well as to provide temporary storage of trains and increase service reliability;
- Turn back of trains at Tunney's Pasture Station, requiring double cross-over tracks immediately east of the LRT platforms;
- Provision for switching trains between the DOTT alignment and a planned LRT line to Riverside South, requiring turnouts and double cross-over tracks west of LeBreton Station. This facility could also be used to turn back trains west of the downtown transit tunnel to provide more reliable or frequent service through the downtown;
- A pocket track east of Hurdman Station to provide temporary storage of trains as well as turn back of trains east of the downtown transit tunnel to provide more reliable or frequent service through the downtown;
- Provision for switching trains between the DOTT alignment and the Maintenance and Storage Facility, requiring turnouts and cross-over tracks east and west of the proposed connecting tracks to the Maintenance and Storage Facility in order to allow trains to enter/exit service from both directions;
- A pocket track west of Blair Station to provide temporary storage of trains and increase service reliability;
- Turn back of trains at Blair Station, requiring double cross-over tracks immediately west of the LRT platform, and;
- Provision of tail-tracks east of Blair Station to allow full operating speed into the station.

### Electrical Substations

A dedicated dual redundant electrical supply is required to provide power to the trains which will run along the line, as well as for the operation of station facilities, communications and safety equipment and lighting. The connections between the Hydro Ottawa power distribution grid and the LRT system occur at regularly spaced electrical susbstations (also referred to as traction power substations). These substations house electrical machinery (transformer/rectifiers, switches and circuit panels) needed to convert high voltage AC power supplies from the main electrical grid in order to support operation of the LRT system. Substations can be provided at-grade or underground, but must be in close proximity to the LRT line.

To meet power requirements, multiple electrical substations are required along the line to distribute power in an efficient manner. The exact number of substations needed to support the project will depend to a great extent on the power requirements of the vehicles and the required operating voltage. Standard 600-750 volts (DC) power typically requires a maximum spacing of 1.5 km to 2.0 km between electric substations. Use of a higher voltage (e.g. 1500 volts) can reduce the number of substations required and provide better fault discrimination; but there are other implications (e.g. increased safety clearances from the higher voltage wires).

Based on the 12.5 km length of the line, and assuming a nominal 600-750 volts (DC) power supply, the DOTT project will require 9 electrical substations along the line, plus an additional higher power substation at the Maintenance and Storage Facility. The final location and configuration of electrical substations will be determined during subsequent phases of design and in collaboration with staff from Hydro One and Ottawa Hydro. Co-location of substations with station facilities will be pursued wherever possible.

### Life Safety

Provision of life safety features and systems will be governed predominately by standards developed by the National Fire Protection Association (NFPA). This includes fire detection and voice alarm systems, smoke control and ventilation systems, communications systems, firefighting equipment and fire fighters facilities, emergency lighting, and construction materials. NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems – 2007 (NFPA 130) provides fire and life safety requirements for passenger railway stations and guideways. Detailed requirements of these systems will be investigated at the preliminary

## Special Trackwork and Electrical Substation Locations

## Life Safety Features

design stage of the project. Below is an overview of the major elements to be provided.

### *Ventilation*

Within the downtown transit tunnel and enclosed stations, ventilation systems will be required in order to allow for smoke control in the event of a fire. Forced air-flow for smoke (and temperature) control will be provided by axial fans served by ventilation shafts, with grilles located within each tunnel bore just beyond both ends of the four stations within the tunnel. In the event of a fire, the two ventilation shafts adjacent to the fire will operate by either extracting smoke from the tunnel or by supplying fresh air from ground level. Jet fans will be employed to provide additional thrust in the cut and cover sections of the tunnel near the west and east portals. Ventilation requirements at St. Laurent and Blair Stations will be further investigated at the preliminary design stage.

### *Emergency Access and Egress*

A walkway will be provided along the LRT alignment to allow for passenger egress along the line in the event of an emergency. This walkway will also allow maintenance workers to access the corridor without obstructing normal LRT operations. Within the downtown transit tunnel, the walkway will be provided on the cross passageway side of the tunnel bore. The walkway surface will be of a uniform, slip resistant design and constructed of non-combustible materials.

Where distances between underground stations are greater than 762 m, NFPA 130 requires the provision of a means of emergency egress from the tunnel. This can be met by the provision of Emergency Exit Buildings (EEBs) which provide access to the surface, or cross-passageways which connect the two tunnel bores. Within the downtown transit tunnel, this requirement applies in the segment between Rideau and Campus Stations, which are located 1105 m apart.

It is proposed that cross-passageways between the two tunnel bores be provided to meet the NFPA 130 requirement, rather than EEBs, which would require additional property and vertical access shafts to construct. In a fire situation, passengers and service personnel can use the cross-passageways to escape into the adjacent fire separated tunnel. Safeguards would need to be employed to ensure train operations in the adjacent tunnel are halted. Three cross-passageways spaced no more than 244 m apart will be required to meet NFPA 130 requirements.

### *Communications*


A centralized Operation Control Centre (OCC), to be housed within the Maintenance and Storage Facility, will be provided to support operation of the LRT system. The OCC will communicate with, supervise, and coordinate all personnel and trains operating on the system during normal operations and be responsible for incident management in cooperating with Emergency Services personnel. Communications points will be provided on all trains and at multiple points within stations to allow passengers to contact operating staff in the event of an emergency. Emergency operating plans and contingencies will be developed as part of implementation of the system.

### Public Art

Public art is an important component of the project and will be accommodated within station and runningway elements of the system. The City of Ottawa has a policy requiring that an amount equal to 1% of an infrastructure project's hard costs be dedicated to the provision of public art. An allowance of $10 million has therefore been included in project costing for public art. In addition to the provision of stand-alone pieces of artwork throughout the system, public art will be integrated into the architectural elements of stations and runningways. Existing public art along the Transitway will be maintained wherever possible.

## Stations and Runningway Segments

Elements common to all or most stations and runningway segments are presented in the next sections. The unique features of each station and runningway segment are described in greater detail in subsequent sections and in the accompanying drawings.

## Overview of Station Elements

Thirteen stations are proposed along the DOTT line. Of these, four will be located underground within the downtown transit tunnel. The other nine stations will be conversions of existing Transitway stations. Tunney's Pasture, Lees, St. Laurent and Cyrville will be straightforward conversions of existing BRT platforms to accommodate LRT technology, while other stations will require more complex reconstruction to accommodate connections to future LRT lines (Bayview), integrate into NCC development lands (LeBreton), accommodate major bus-rail passenger transfers (Hurdman, Blair) or provide an improved alignment for rail operations (Train).

Stations along the line will have the following general elements in common.

### *Station Entrances*

Station entrances provide access from surrounding streets and buildings to the LRT platform. Entrances can be stand-alone facilities or integrated into existing or future buildings. At underground stations, a minimum of two separate entrances providing access from the surface to platform level will be provided, in accordance with NFPA 130 requirements. Station entrances will be provided with combinations of stairs, escalators and elevators to provide access to the LRT platform.

### *Accessibility*


All stations will be designed to provide barrier free access, according to or exceeding governing building codes and statutory requirements. Redundancy in elevating devices will be provided at key station access points to ensure wheelchair users are not inconvenienced when one elevator is out of service.

Passengers with visual or cognitive disabilities will be accommodated through provision of design treatments which will provide for safe and easy navigation through the station area. Specific designs will be developed through the detailed design process.

### *Concourse*

Underground and more complex stations will have a concourse level to accommodate passenger transfers, connections to multiple entrances and passageways within the station area. Concourses will be designed to accommodate fare collection/vending facilities and other facilities, such as retail kiosks, where appropriate. In underground stations, the concourse level will be designed to act as an emergency refuge area should the platform area need to be evacuated due to an emergency at track level.

### *LRT Platform*

Stations will have either a "side platform" or "centre platform" configuration. Within the platform area, amenities such as seating, litter and recycling receptacles, telephones, designated waiting areas, emergency communications, will be provided. Placement and design of these amenities will be determined during the detailed design phase.

All platforms have been designed to an ultimate 180 m length, with the full 180 m being activated initially for the underground stations and 120 m being activated for the at grade and elevated stations. The station plans clearly indicate where the active platform areas in relation to the ultimate 180 m length.

In underground stations, platform edge doors will be provided in order to enhance passenger safety, facilitate efficient loading and unloading of trains and reduce potential for intrusion onto the tracks.

### *Platform Edge Doors*

Stations within the downtown transit tunnel will be supplied with platform edge doors, which will prevent unauthorized intrusion onto the tracks. The provision of platform edge doors will also have benefits to ventilation requirements and passenger comfort at platform level as the piston effect of air pushed ahead of trains entering into the station will be dissipated into the upper area of the station cavern.

Use of platform edge doors at other station locations will be investigated further at the preliminary design stage.

### *Bicycle Facilities*

All stations will incorporate facilities for bicycles (e.g. bicycle racks, public bicycle rental stations). The location and facility requirements at each station will be determined during detailed design. At several locations, LRT stations will provide direct connections to existing or proposed multi-use pathways or dedicated bicycle facilities.

### *Bus Connections*

Most stations along the line will provide for direct transfers between LRT and local or rapid transit buses. Connections will range from on-street bus stops adjacent to station entrances to integrated bus terminals to handle major transfers between modes.

### *Ventilation Shafts*

Fire ventilation shafts are incorporated into underground stations to balance air pressure within the tunnels and stations and to provide for emergency exhaust and fresh air supply in case of an underground fire. Ventilation fans can also be used to alleviate high summer temperatures in the underground stations. The ventilation shafts emanate from high capacity emergency fan systems sitting above the tunnels at the end of each underground station and serve to remove smoke in the event of a fire in the station or on a train, discharging the smoke at the surface level.

Vent shafts at grade are the cheapest solution but generally not the preferred or ideal. Horizontal vent shafts allow precipitation to enter. Especially if located adjacent to a snow ploughing route, the snow gets piled atop the vent shaft potentially blocking air circulation and when melting, allowing water to enter the tunnel and/or fan area. Best practices for vent shafts within compact urban environments illustrate the trend towards vertical shaft structures for safety and urban design considerations. Locating vent shafts at grade, in particular exhaust shafts can potentially lead to smoke risks at street level for pedestrians and vehicles.

### *Fare Collection*

The fare collection method to be implemented as part of the DOTT project will be determined by the operator prior to commencement of service. Stations have been designed to accommodate provision of fare collection facilities, including ticket machines, fare collection barriers, and information kiosks.

## Overview of Runningway Elements

Runningways will consist of converted Transitway and new at-grade, elevated and underground segments, with the following elements in common.

### *Track*

LRT trains will run on standard gauge (1435 mm) track. On surface segments between stations, ballasted track laid directly overtop of the existing Transitway alignment will be employed. Within surface stations, direct fixation of track to a concrete slab will be employed. Within the downtown transit tunnel, direct fixation of tracks will also occur, using a combination of floating concrete slabs and double ties, which are designed to minimize noise and vibration effects of train operations to an acceptable level.

### *Service/Emergency Access*

Access points to allow service or emergency vehicles to gain access to the LRT corridor will be provided at key points along the LRT corridor. Existing Transitway access points along the corridor will likely be re-purposed for this use. A walkway will be provided within the LRT alignment to allow evacuation of passengers in an emergency and to allow maintenance workers to access the corridor without disruption to normal operations.

### *Overhead Power Supply*

LRT trains will run on electrical power, delivered along the line from electrical substations via overhead wires commonly referred to as an Overhead Catenary System (OCS). LRVs obtain power from the OCS by means of a device called a pantograph, attached to the roof of the LRV. On surface and elevated segments the OCS will be mounted on support poles located between or to the side of the tracks. Exact location of support poles will be determined during detailed design of the alignment. Within the downtown transit tunnel, the OCS will be directly fixed to the roof of the tunnel.

## Tunney's Pasture Station

Tunney's Pasture Station will serve as the western terminus for the DOTT and accommodate transfers from BRT service from the west and southwest until such time that the LRT system is expanded further to Baseline Station in accordance with the Transportation Master Plan (TMP) and subject to a future Transit Planning and Environmental Assessment Study. The Station will accommodate bus and rail transfers for approximately 9,000 passengers/hour during peak operating times.

Passengers originating from the west or southwest areas of Ottawa (Kanata, Barrhaven) will arrive at the station via a new temporary bus terminal to be constructed on the north side of the existing Transitway corridor, reached via an existing bus ramp located west of the station which will be modified to improve bus operations by reducing the existing grade of the ramp. The temporary BRT facility will provide sufficient platform space to handle BRT operational requirements as well as turn-around facilities for buses and an enclosed waiting area for passengers.

From here, passengers will transfer to the LRT platform via an underground passageway to be built linking the new temporary bus terminal with the new LRT platforms, which will be located at the existing Transitway level of the station, where the BRT platforms currently exist. These platforms would be widened and extended to provide 120 m long LRT platforms in a side-platform configuration. Protection for future platform extension (to the east) to allow 180 m LRT platforms (permitting 6-car train operation) is accommodated. An enclosed platform canopy would cover the LRT platforms to protect passengers from inclement weather. To enable access to the south LRT platform, an at-grade crossing of the tracks would be permitted. This crossing would be beyond the normal operating area of the LRT.

For passengers arriving at the station on local buses, the existing bus stop facilities along Scott Street would remain to serve local service. Walk-in traffic or cyclists would access the station via the existing station entrances located on the north and south side of the Transitway and reach the new LRT platforms via the existing internal stairs or elevators, which will be upgraded. The existing access stairs located at the west end of the existing station will be rehabilitated and opened to general use in order to provide a secondary access directly to the new LRT platforms.

### *Development Integration Opportunities*

The Federal Government has plans to develop the Tunney's Pasture site to eventually accommodate 25,000[1] jobs. A Master Planning exercise is currently being undertaken by Public Works and Government Services Canada (PWGSC) to assess future development potential on the site. Integration of the station with future PWGSC development plans for the Tunney's Pasture employment node can be accommodated. Once LRT is extended to Baseline Station and the BRT transfer facilities are no longer required, these lands can be re-purposed for development. The planned underground pedestrian connection between the BRT and LRT platforms would provide for direct access into any building located on this site, and could also be extended to serve other buildings on the site.

### *Future LRT Extension*

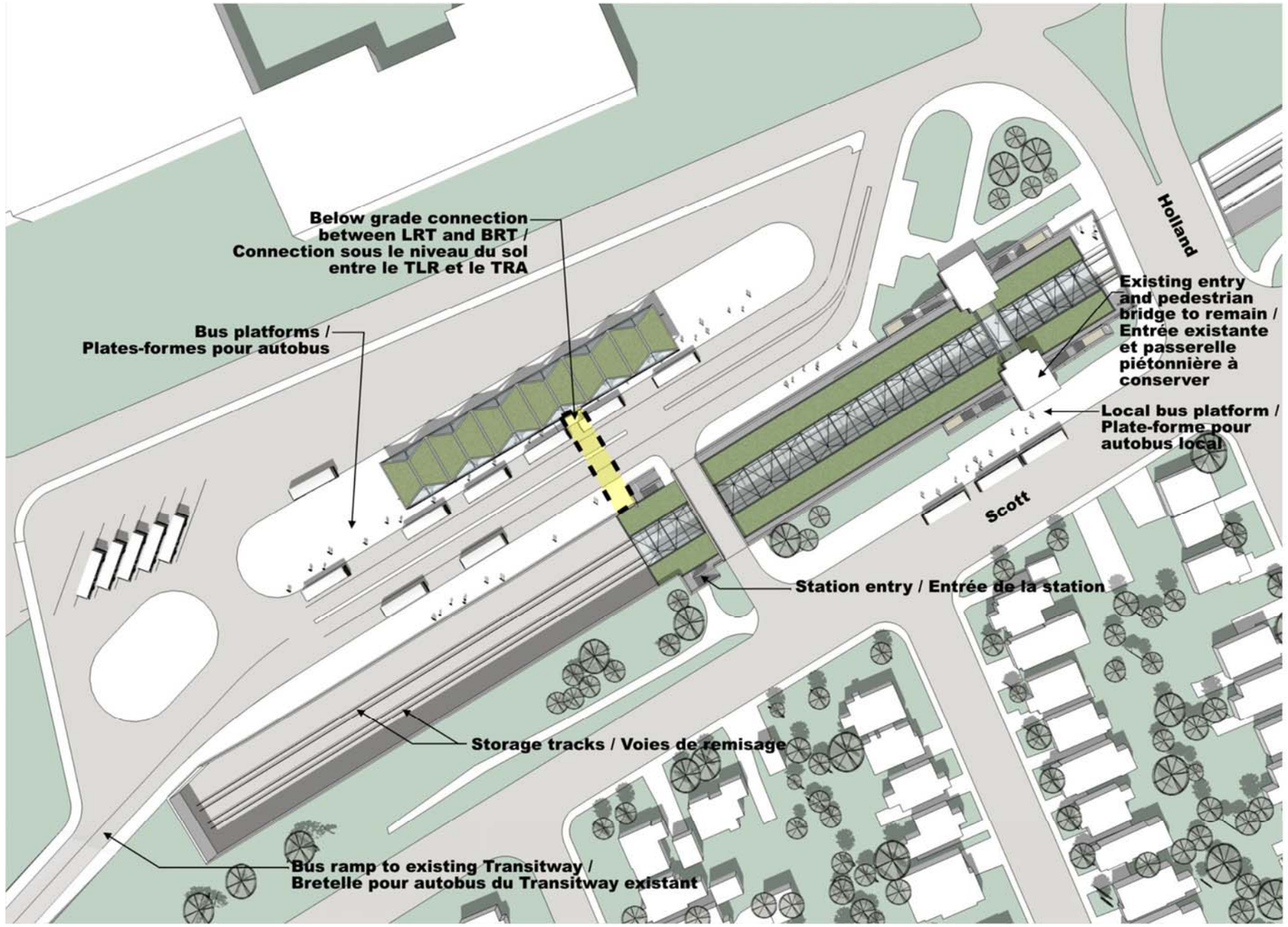
The City of Ottawa will be initiating a Planning and Environmental Assessment Study to extend LRT west to Baseline Station, as identified in the City's TMP. Should the results of the study recommend extension of the LRT west of Tunney's Pasture using the existing Transitway corridor, the fill placed to accommodate the modified bus ramp west of the station would be removed and the Transitway converted to accommodate LRT. The temporary bus terminal would no longer be required, and these lands could be re-purposed to allow development immediately adjacent to or integrated into the LRT station.

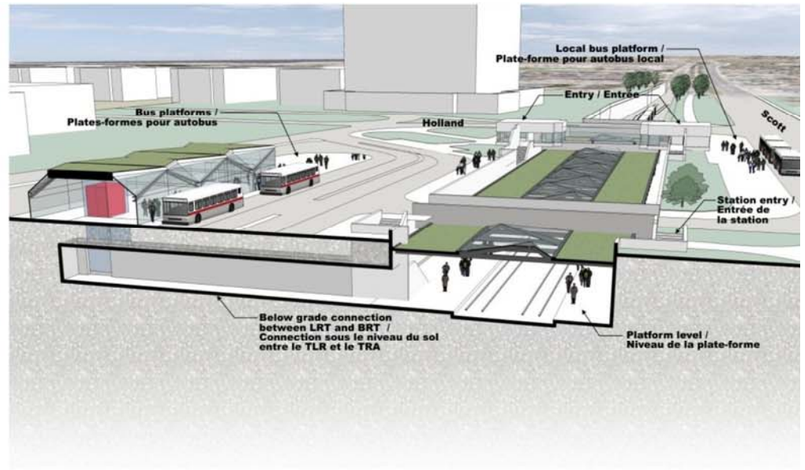
[1] It should be noted that the 2031 Transportation Model has 15,000 jobs on this site.

## Tunney's Pasture – Bayview Runningway

Between Tunney's Pasture and Bayview Station, the LRT corridor will re-use the existing Transitway corridor, which is located within a below-grade trench between Tunney's Pasture Station and Carruthers Avenue. Existing overhead structures (roadway overpasses at Holland, Parkdale, Hinchey and Carruthers) would remain unchanged, with an additional vertical clearance required for LRT operations achieved through a lowering of the Transitway grade. Further work will be required during preliminary design stage to address constraints posed by twin 3800 mm x 2000 mm box storm sewers which run under this section of the Transitway. Construction of new access points (e.g. offset maintenance holes) to these sewers may be required.

East of Carruthers Avenue, the existing Transitway rises out of the trench onto an elevated structure, with an overpass at Bayview Road. The LRT alignment will re-use this structure, but east of Bayview Road it will shift to the north of the existing Transitway before entering Bayview Station, which will be on a new elevated structure spanning the O-Train corridor. The existing Transitway bridge at this location would be removed during construction. Shifting the LRT alignment to the north at this location allows Bayview Station, a complex facility which must accommodate multiple transit corridors, to be constructed while maintaining bus operations along the existing Transitway for a much longer period of time.


Below grade connection between LRT and BRT / Connection sous le niveau du sol entre le TLR et le TRA
Bus platforms / Plates-formes pour autobus
Holland
Existing entry and pedestrian bridge to remain / Entrée existante et passerelle piétonnière à conserver
Local bus platform / Plate-forme pour autobus local
Scott
Station entry / Entrée de la station
Storage tracks / Voies de remisage
Bus ramp to existing Transitway / Bretelle pour autobus du Transitway existant


Local bus platform / Plate-forme pour autobus local
Entry / Entrée
Bus platforms / Plates-formes pour autobus
Holland
Scott
Station entry / Entrée de la station
Below grade connection between LRT and BRT / Connection sous le niveau du sol entre le TLR et le TRA
Platform level / Niveau de la plate-forme


Local bus platform / Plate-forme pour autobus local
Station entry / Entrée de la station
Holland
Bus platforms / Plates-formes pour autobus
Scott
Platform level / Niveau de la plate-forme
Pedestrian connection to BRT / Connection piétonnière au TRA
Storage tracks / Voies de remisage

## Bayview Station

Bayview Station will be a transfer point between the DOTT and the existing O-Train/future North-South LRT. Additionally, the design must consider the potential for interprovincial transit service via the Prince of Wales Bridge. The recommended configuration provides for eventual through movements to/from the North-South LRT line to the core area without having passengers transfer and addresses a direct connection to the core from the Airport and between Carleton University and the University of Ottawa, when the North-South line is converted to electrified light rail as identified in Increment 2 of the TMP.


Bayview Station will be a three level station, incorporating upper and lower levels for transit platforms, and an intermediate concourse level for transfers and a pedestrian connection through the station between Scott Street and future NCC development lands located to the north of the station. Passengers arriving at the station on the DOTT line will alight on the upper level platforms, which will be in a side-platform configuration. The 120 m LRT platforms will be fully enclosed to protect passengers from the elements. Protection for future platform extension (to the east) to allow 180 m LRT platforms (permitting 6-car train operation) is accommodated. Stairs, escalators and elevators provide passenger connections to the intermediate concourse level and lower level transit platforms.

From the intermediate level, passengers can exit the station to Scott Street via a raised pedestrian walkway at the east end of the station, or direct connection at the west end of the station. Additional pedestrian connections from this level can be provided in the future to potential development lands to the north (NCC) or west (existing City Bayview Snow Disposal Facility).

Passengers transferring to the existing O-Train/future N-S LRT or interprovincial transit would descend to the lower level platforms. The existing O-Train would be accommodated by a relocated platform at the west end of the station, perpendicular to the upper level DOTT platforms, along the alignment of the existing rail corridor leading to the Prince of Wales Bridge. Platforms for a future N-S LRT would be accommodated at the east end of the station, parallel to the DOTT corridor located on the upper level. A 90 m LRT platform in a centre-platform configuration, capable of accommodating 3-car LRT trains on this line will be provided. This platform could also accommodate future extension of LRT service to Gatineau, with a flat junction between the N-S LRT tracks and the interprovincial tracks. In the interim, the lower level platforms could be used as a temporary bus facility. A future planned multi-use pathway located along the west side of the existing O-Train corridor would connect through the station in the area of the relocated O-Train platform, which would no longer be needed for transit purposes after conversion of this corridor to electric LRT.

### *Development Integration Opportunities*

As the station site is located adjacent to the Bayview and Somerset Area redevelopment lands, potential integration of the station design into future development is important. The recommended alignment and new LRT station design therefore seeks to maximize the development potential for lands adjacent to the station that are in both public and private ownership. Subsequent design phases can also assess the potential for development of the land between the station and Albert Street.

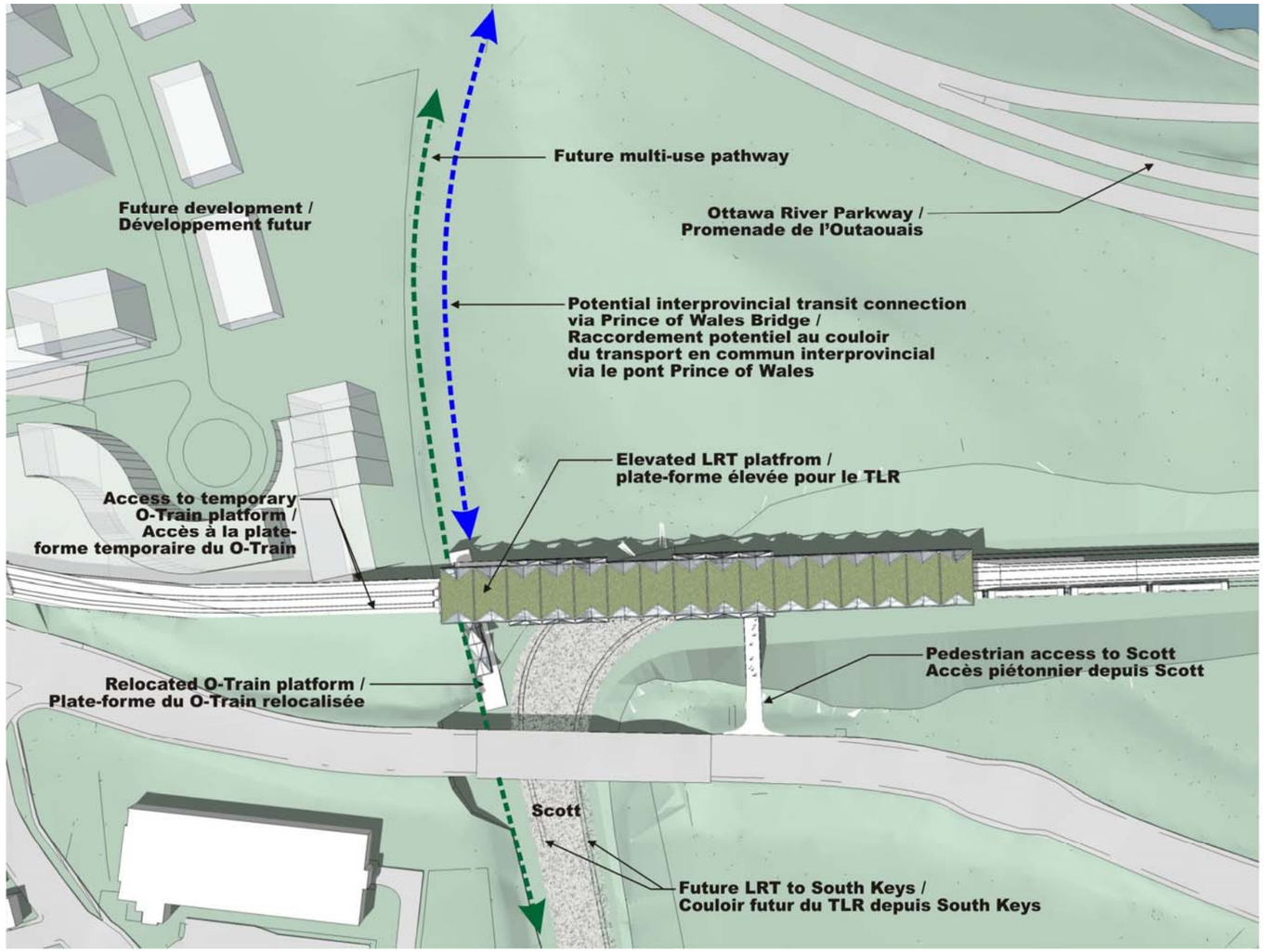
### *Future LRT Extension*

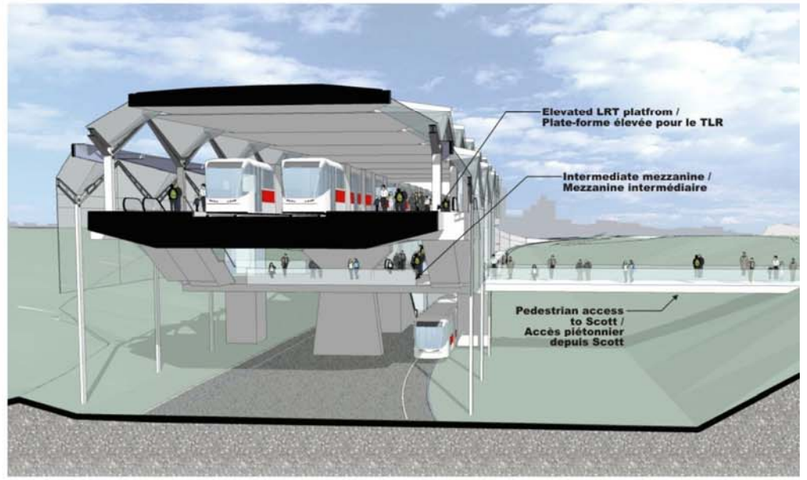
Bayview Station will be a future junction/transfer station between the DOTT line and a future North-South LRT line to South Keys and Riverside Side, identified in the City's TMP. As described above, the design of Bayview Station accommodates this future line on a lower level platform, with a direct track connection east of the station enabling direct LRT service between downtown Ottawa and the future North-South LRT.

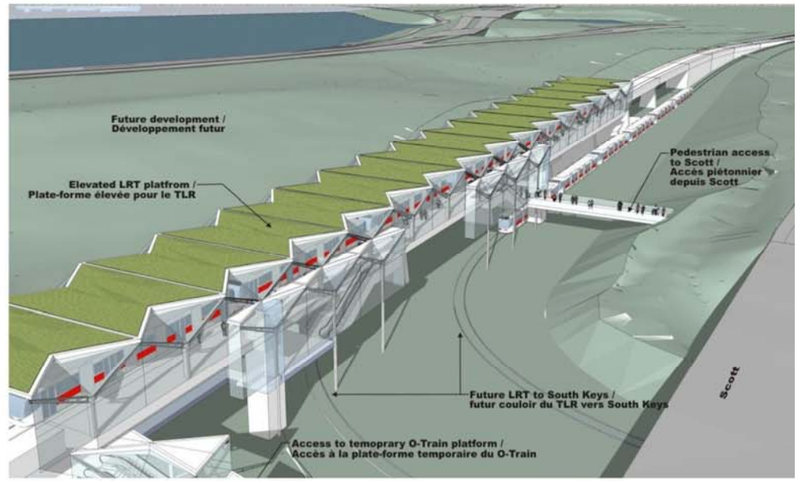
Bayview Station has also been identified as a potential transfer station for interprovincial transit service via the Prince of Wales Bridge. The ongoing Interprovincial Transit Strategy is currently considering options for future transit corridors linking Ottawa and Gatineau. The design of Bayview Station would allow for future interprovincial LRT service to be accommodated on the lower level (N-S LRT) platform, with a junction between the two lines occurring east of the lower level platforms in the vicinity of the relocated O-Train platform.

## Bayview – LeBreton Runningway

After leaving Bayview Station, the LRT alignment descends back towards grade level and shifts to the south side of the existing Transitway, to run in 2 previously defined corridor agreed to between the NCC and the City of Ottawa as part of the previous N-S LRT project and the NCC's LeBreton Flats Area redevelopment plan. East of the existing bus lay-up facility, an extended Preston Street will pass over the LRT corridor. At this point, turnouts and a double cross-over track will be provided to connect the DOTT line with the future N-S LRT. East of Preston Street, the LRT corridor will initially be constructed in a cut, but will be designed to allow future NCC development to be built over top of the tracks.


Future development /
Développement futur
Future multi-use pathway
Ottawa River Parkway /
Promenade de l'Outaouais
Potential interprovincial transit connection
via Prince of Wales Bridge /
Raccordement potentiel au couloir
du transport en commun interprovincial
via le pont Prince of Wales
Elevated LRT platfrom /
plate-forme élevée pour le TLR
Access to temporary
O-Train platform /
Accès à la plate-
forme temporaire du O-Train
Pedestrian access to Scott
Accès piétonnier depuis Scott
Relocated O-Train platform /
Plate-forme du O-Train relocalisée
Scott
Future LRT to South Keys /
Couloir futur du TLR depuis South Keys


Elevated LRT platfrom /
Plate-forme élevée pour le TLR
Intermediate mezzanine /
Mezzanine intermédiaire
Pedestrian access
to Scott /
Accès piétonnier
depuis Scott


Future development /
Développement futur
Elevated LRT platfrom /
Plate-forme élevée pour le TLR
Pedestrian access
to Scott /
Accès piétonnier
depuis Scott
Future LRT to South Keys /
futur couloir du TLR vers South Keys
Scott
Access to temoprary O-Train platform /
Accès à la plate-forme temporaire du O-Train

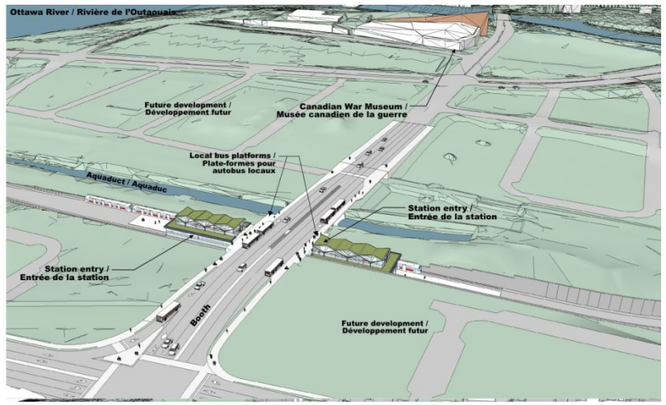
## LeBreton Station

LeBreton Station will support future redevelopment of adjacent lands and provide for transfers to OC Transpo bus service to and from Gatineau using Booth Street. The station will be located underneath a new Booth Street bridge, which will span over the LRT corridor and the adjacent aqueduct located north of the station.


LRT passengers will arrive on the lower level of the station, which will consist of a 120 m LRT platform in a centre-platform configuration, expandable to 180 m long to accommodate 6-car trains in the future. Two station entrances, one on each side of Booth Street will be provided, with escalators, elevators and stairs connecting the upper and lower levels of the Station. At the upper level, direct access to wide sidewalks on Booth Street is provided. Sheltered waiting facilities are provided for passengers transferring to northbound and southbound buses. Dedicated bus facilities will be provided on the new Booth Street bridge to accommodate OC Transpo buses.

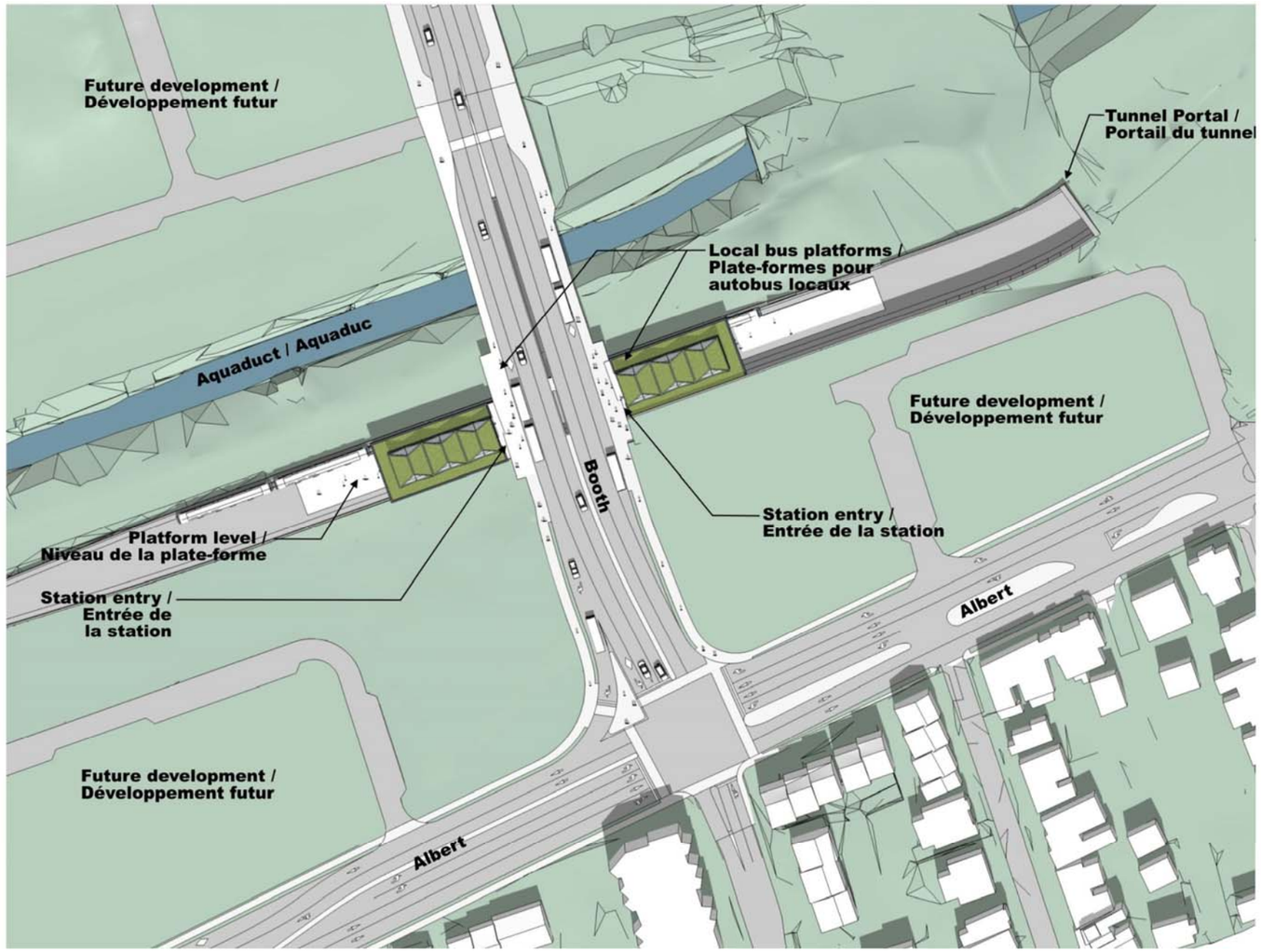
### *Development Integration Opportunities*

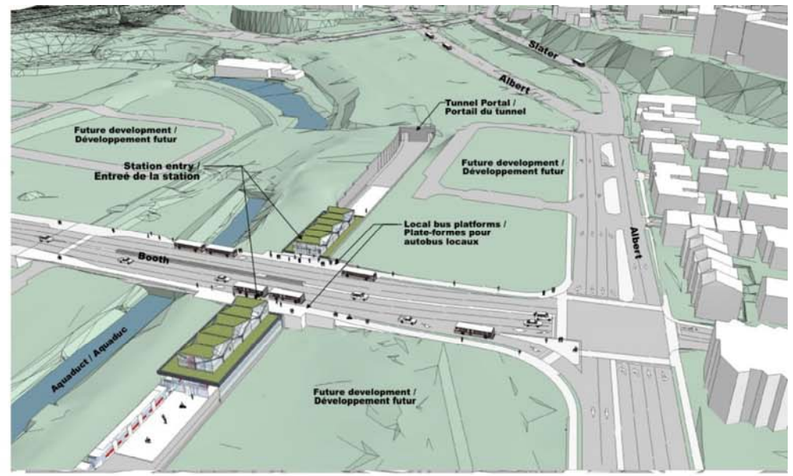
The station can be directly integrated into future development on NCC land and will also support development on the City's adjacent Escarpment Area development lands.

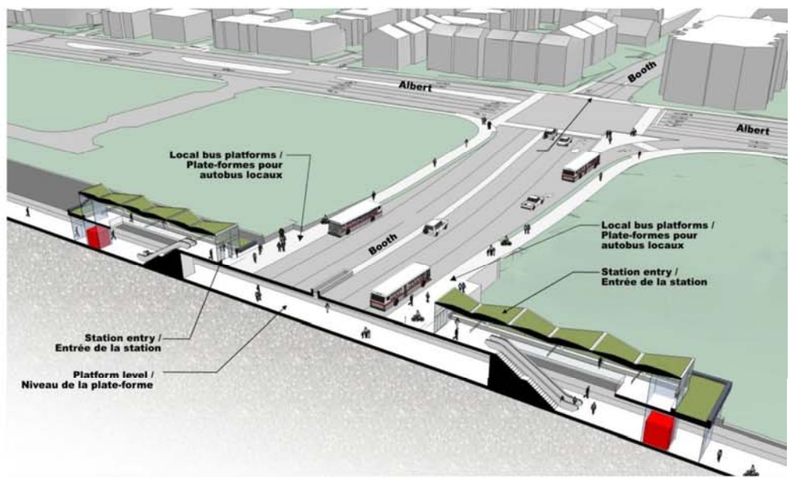



## LeBreton – Downtown West Runningway

After leaving LeBreton Station, the LRT alignment continues east, curving to follow an existing City road right-of-way (Wellington Street) and entering the west portal of the downtown transit tunnel at Brickhill Street. The horizontal alignment through this area has been designed to maximize the development potential of the City-owned lands south of Wellington Street (Escarpment Area lands). West of Commissioners Street, the alignment will curve again to line up with Albert Street before entering into Downtown West Station.


Future development /
Développement futur
Tunnel Portal /
Portail du tunnel
Local bus platforms /
Plate-formes pour
autobus locaux
Aquaduct / Aquaduc
Future development /
Développement futur
Booth
Station entry /
Entrée de la station
Platform level /
Niveau de la plate-forme
Station entry /
Entrée de
la station
Albert
Future development /
Développement futur
Albert


Slater
Albert
Tunnel Portal /
Portail du tunnel
Future development /
Développement futur
Station entry /
Entrée de la station
Future development /
Développement futur
Local bus platforms /
Plate-formes pour
autobus locaux
Booth
Albert
Aquaduct / Aquaduc
Future development /
Développement futur


Albert
Booth
Albert
Local bus platforms /
Plate-formes pour
autobus locaux
Local bus platforms /
Plate-formes pour
autobus locaux
Booth
Station entry /
Entrée de la station
Station entry /
Entrée de la station
Platform level /
Niveau de la plate-forme

## Downtown West Station

Downtown West Station will be located under Albert Street, east of Bay Street. This location serves existing development in the west end of downtown and allows the station to be integrated directly into the proposed Central Library building.

The platform level of the station consists of a 180 m LRT platform in a centre-platform

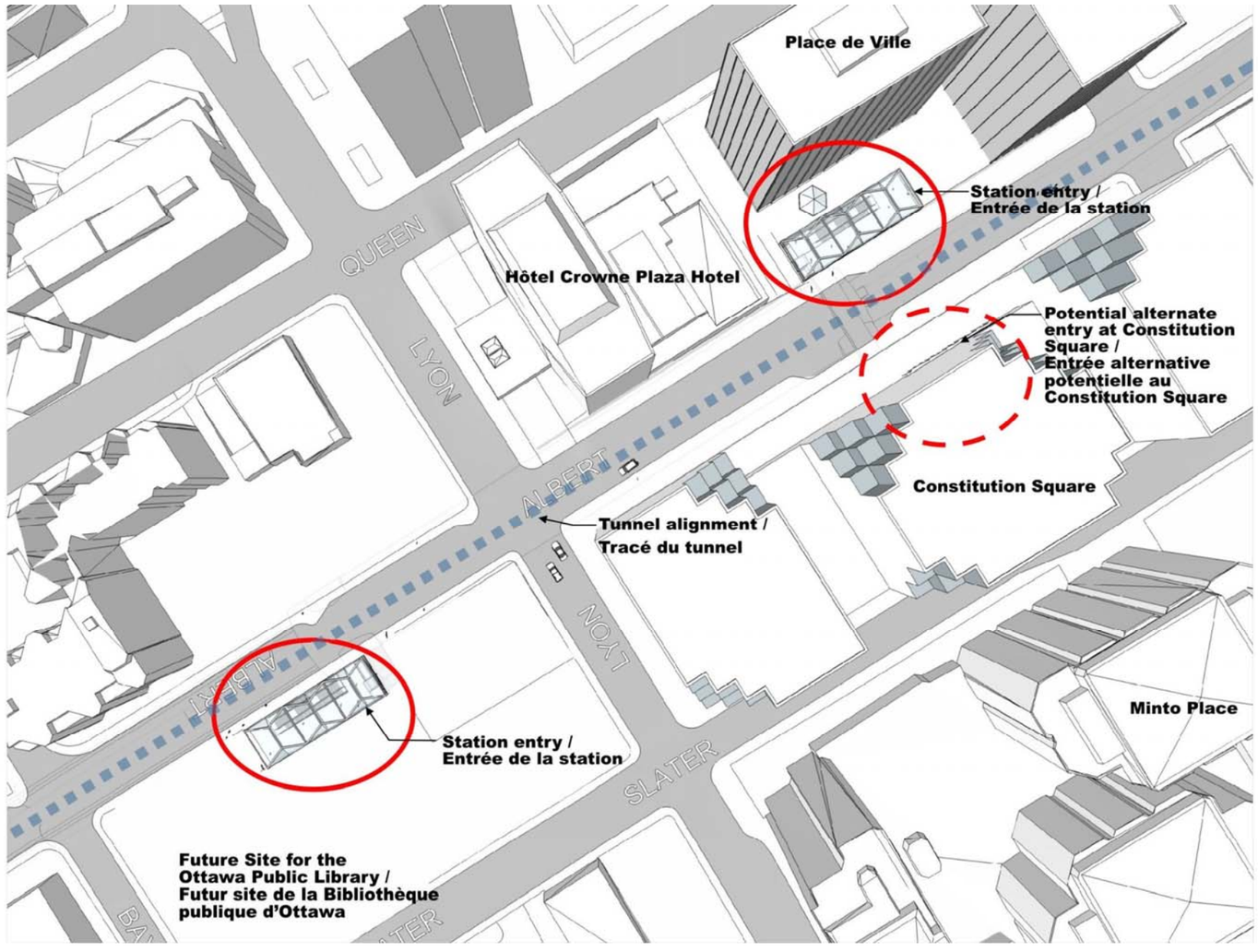
configuration, to accommodate 4-car trains initially and 6-car trains in the future. Passengers will exit the platform via one of two access points located at either end of the platform to reach a concourse level which spans over the LRT tracks and leads to stair, escalator and elevator connections to the surface.

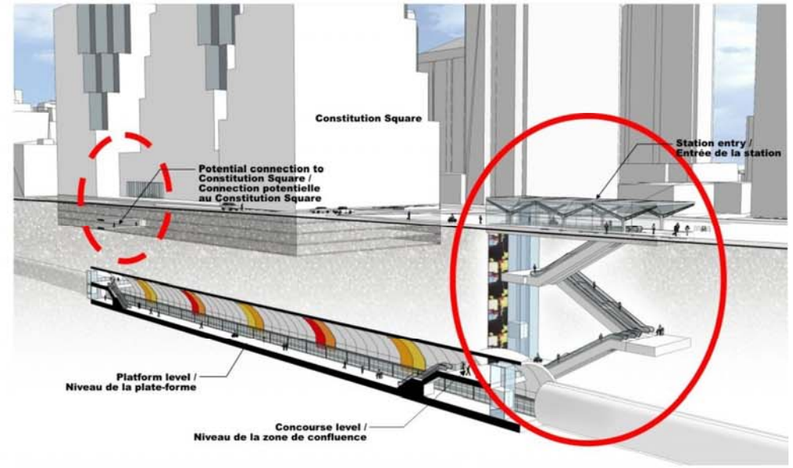
Passengers exiting via the west station entrance will come to the surface on the south side of Albert Street, between Bay Street and Lyon Street. This station entrance is located on lands proposed for a new Central Library building and presents opportunities for direct integration of the station entrance into this future development. Additional underground connections could be provided from this development block to other existing or future developments within the vicinity of the station (e.g. former Ottawa Technical High School site or lands on north side of Albert).

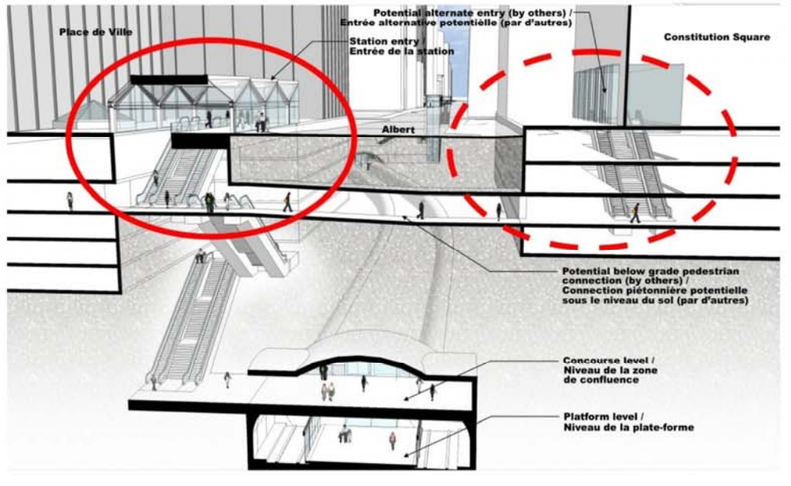
Passengers exiting via the east station entrance will come to the surface along Albert Street, between Lyon Street and Kent Street. This station entrance has opportunities for integration into either the Place de Ville or Constitution Square developments. Alternatively, the station entrance could be provided within the public road right-of-way on the north side of Albert Street, in the vicinity of the existing Kent Transitway station. Additional opportunities for underground connections to existing and future developments (e.g. lands situated on the northeast corner of the Albert/Kent intersection) could also be provided.

## Downtown West – Downtown East Runningway

Leaving Downtown West Station the LRT alignment remains under Albert Street. East of Kent Street the alignment curves north and continues under existing buildings along the north side of Albert Street before entering Downtown East Station.


Place de Ville
QUEEN
LYON
Hôtel Crowne Plaza Hotel
Station entry /
Entrée de la station
Potential alternate
entry at Constitution
Square /
Entrée alternative
potentielle au
Constitution Square
Constitution Square
ALBERT
Tunnel alignment /
Tracé du tunnel
LYON
ALBERT
Station entry /
Entrée de la station
Minto Place
SLATER
Future Site for the
Ottawa Public Library /
Futur site de la Bibliothèque
publique d'Ottawa


Constitution Square
Potential connection to
Constitution Square /
Connection potentielle
au Constitution Square
Station entry /
Entrée de la station
Platform level /
Niveau de la plate-forme
Concourse level /
Niveau de la zone de confluence


Place de Ville
Potential alternate entry (by others) /
Entrée alternative potentielle (par d'autres)
Station entry /
Entrée de la station
Constitution Square
Albert
Potential below grade pedestrian
connection (by others) /
Connection piétonnière potentielle
sous le niveau du sol (par d'autres)
Concourse level /
Niveau de la zone
de confluence
Platform level /
Niveau de la plate-forme

## Downtown East Station

Downtown East Station is located north of Albert Street, between Bank Street and O'Connor Street, to provide connections to local bus services on Bank Street and serve existing development in central and east parts of downtown.


The platform level of the station consists of a 180 m LRT platform in a centre-platform configuration, to accommodate 4-car trains initially and 6-car trains in the future. Passengers will exit the platform via one of the access points located at either end of the platform to reach a concourse level which spans over the LRT tracks and leads to stair, escalator and elevator connections to the surface.

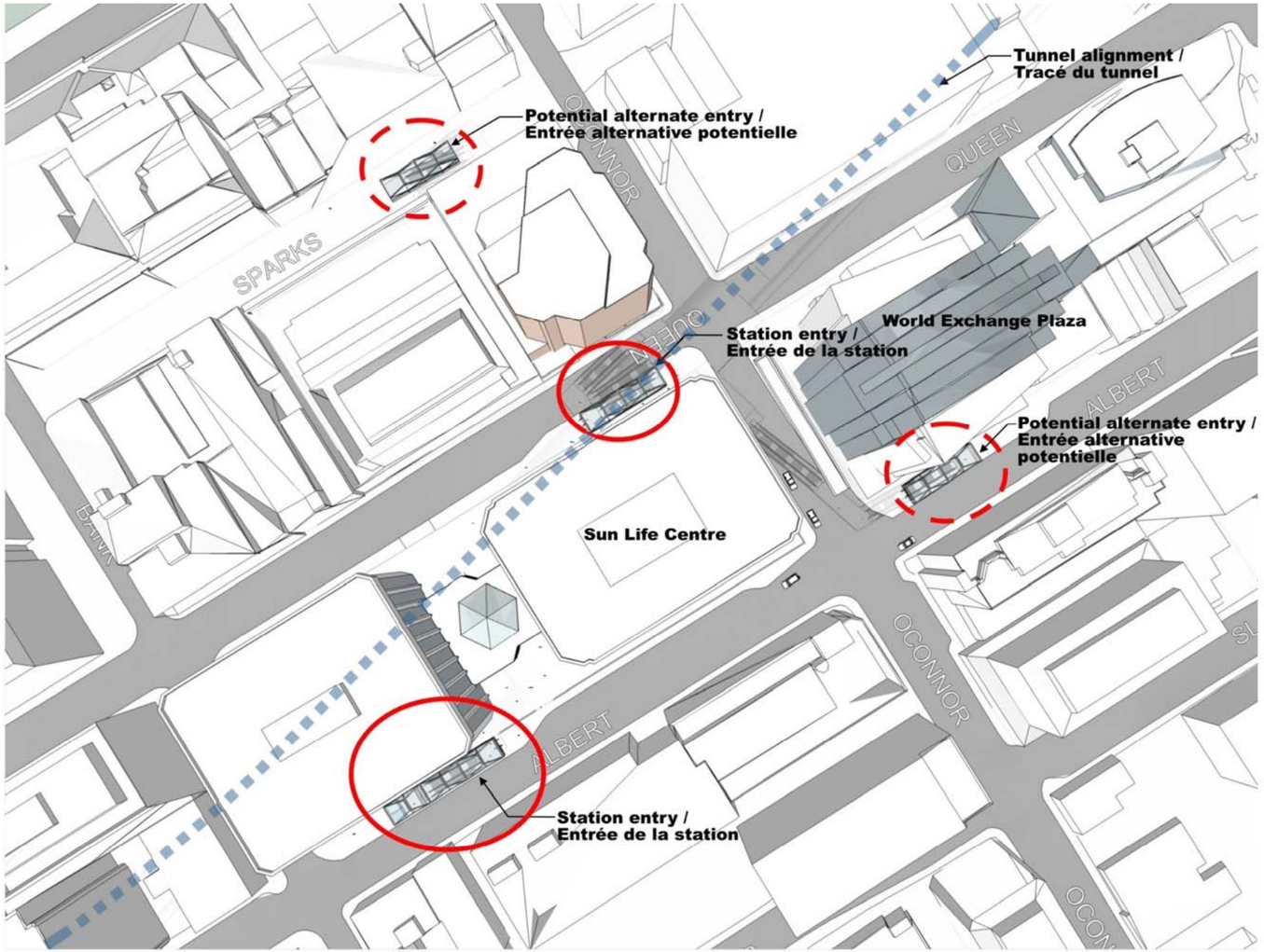
Passengers exiting via the west station entrance will come to the surface at the northeast corner of the Bank/Albert intersection. This station entrance could be provided within the Albert Street right-of-way, or integrated into the existing Sun Life building.

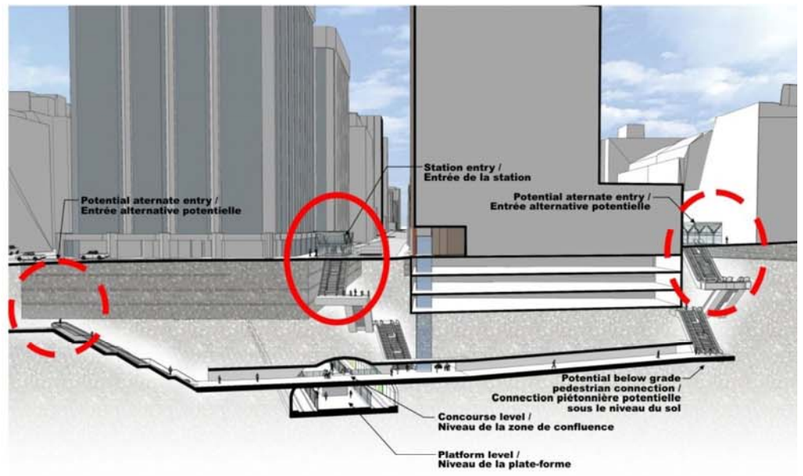
Additional underground connections could be provided to other buildings in the area. A connection to the west side of Bank Street would be desirable in order to provide a weather-protected link for passengers transferring to or from southbound local buses on Bank Street.

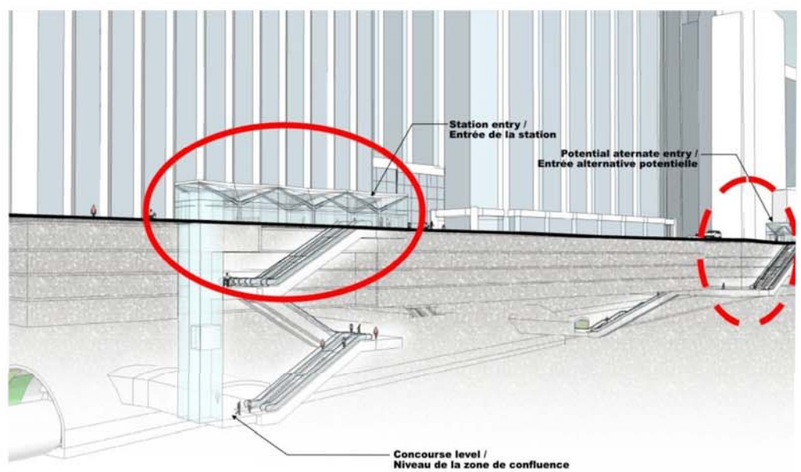
Passengers exiting via the east station entrance will come to the surface at the southwest corner of the Queen/O'Connor intersection. As currently proposed, stair and escalator connections would be located on the south side of Queen Street, with elevators provided on the north side (within the existing Heritage Place building). Additional underground connections from the east concourse level to the World Exchange Plaza and Sparks Street (west of O'Connor Street) are shown as possible connections, to be built by others. These connections would extend the weather-protected catchment area of the station to include a significant trip generating destination and support revitalization of the Sparks Street pedestrian mall.


## Downtown East – Rideau Runningway

Leaving Downtown East Station, the tunnel continues north and east on a diagonal alignment, passing under the south end of Confederation Square and the National War Memorial before entering Rideau Station.


Tunnel alignment /
Tracé du tunnel
Potential alternate entry /
Entrée alternative potentielle
SPARKS
QUEEN
O'CONNOR
Station entry /
Entrée de la station
World Exchange Plaza
ALBERT
Potential alternate entry /
Entrée alternative
potentielle
Sun Life Centre
BANK
ALBERT
OCONNOR
Station entry /
Entrée de la station


Potential alternate entry /
Entrée alternative potentielle
Station entry /
Entrée de la station
Potential alternate entry /
Entrée alternative potentielle
Potential below grade
pedestrian connection /
Connection piétonnière potentielle
sous le niveau du sol
Concourse level /
Niveau de la zone de confluence
Platform level /
Niveau de la plate-forme


Station entry /
Entrée de la station
Potential alternate entry /
Entrée alternative potentielle
Concourse level /
Niveau de la zone de confluence

## Rideau Station

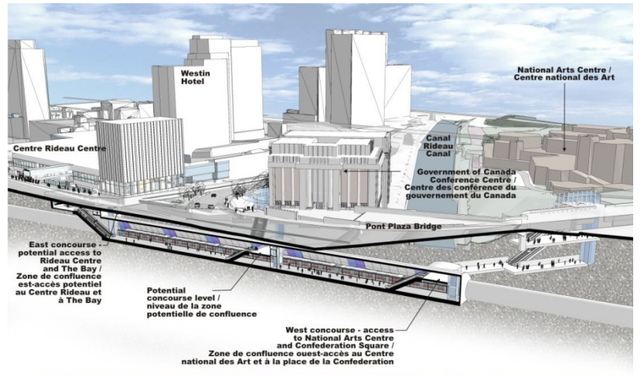
Rideau Station will be located south of Wellington Street, between Confederation Square and Sussex Drive and has been designed to provide connections to both the west and east sides of Rideau Canal.

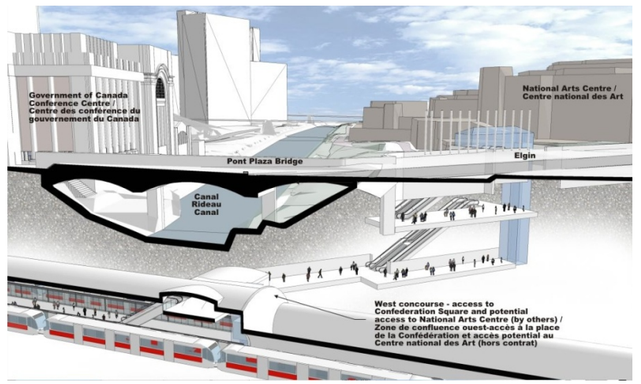
The platform level of the station consists of a 180 m LRT platform in a centre-platform configuration, to accommodate 4-car trains initially and 6-car trains in the future. Passengers will exit the platform via one of the access points located at either end of the platform to reach a concourse level which spans over the LRT tracks and leads to stair, escalator and elevator connections to the surface.

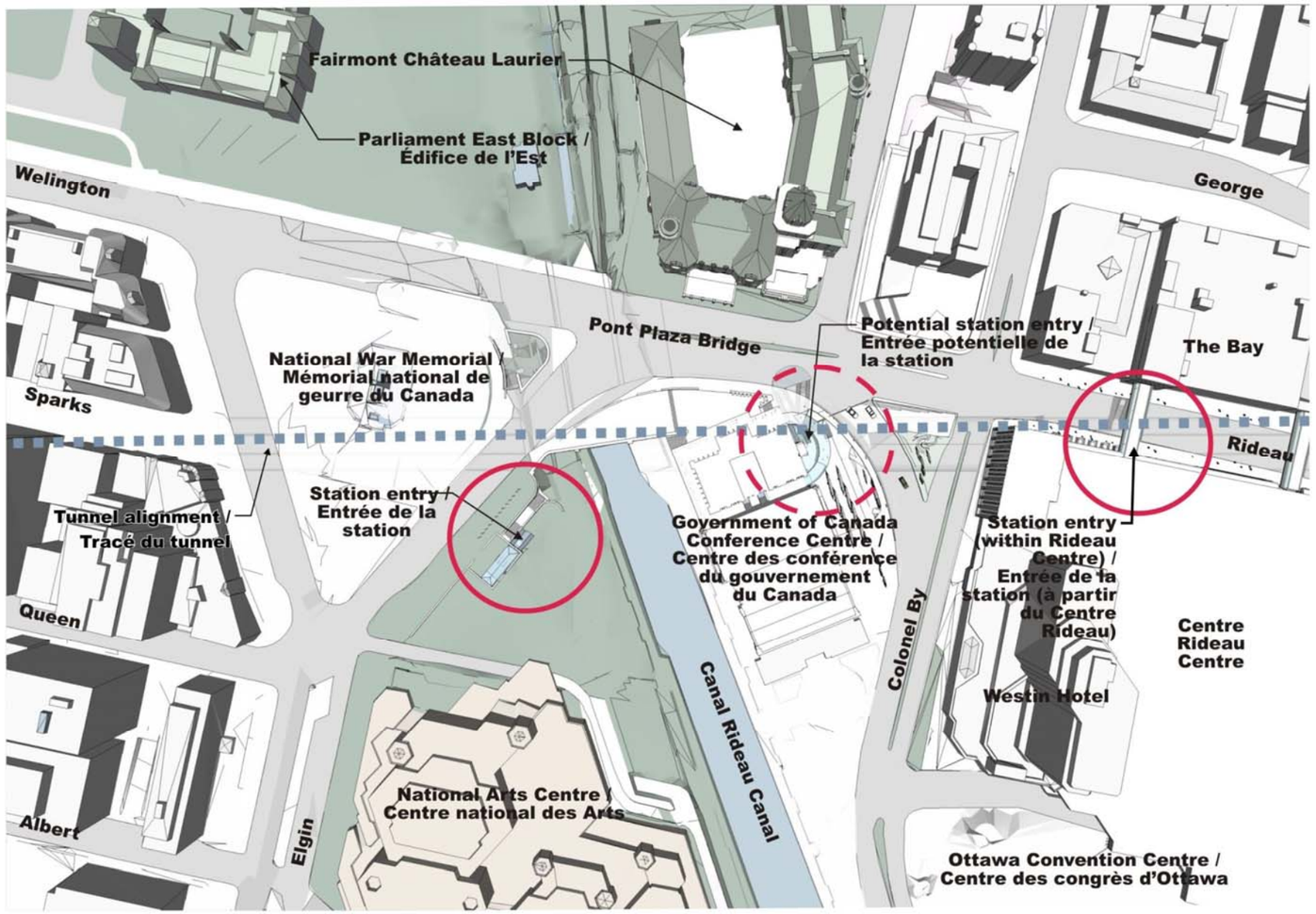
Passengers exiting via the west station entrance will come to the surface on the east side of Elgin Street, at Confederation Square, with views to the National War Memorial, Parliament Hill, Chateau Laurier, and Government Conference Centre providing for an iconic arrival experience from this station entrance. The location of this station entrance would provide direct access to the LRT station for people attending events at Confederation Square and along the Rideau Canal. The design of this station entrance requires further discussion with NCC and Parks Canada staff during subsequent design phases to ensure that any visual impact to established view corridors and the Rideau Canal zone are minimized. There is an opportunity to integrate with NCC plans for a barrier free connection between the canal level and Confederation Square. A direct underground connection into the National Arts Centre (P1 level) could be also provided, allowing weather-protected connections between the NAC and the LRT station.

Passengers exiting via the east station entrance will come to the surface along Rideau Street, east of Sussex Drive, within the Rideau Centre (south side) or The Bay (north side). The exact location(s) of the station entrances will be determined in consultation with these landowners during subsequent design phases. There are significant opportunities available to integrate this station with an expanded Rideau Centre, and provide weather-protected access to adjacent buildings and destinations (e.g. DND Headquarters, ByWard Market). Passengers transferring to local or STO buses on Rideau Street would have a weather-protected connection between the on-street bus stops and the LRT platform. Passengers transferring to other local bus services, which will be relocated to serve the existing Mackenzie-King Station, will have a weather-protected connection through the Rideau Centre.

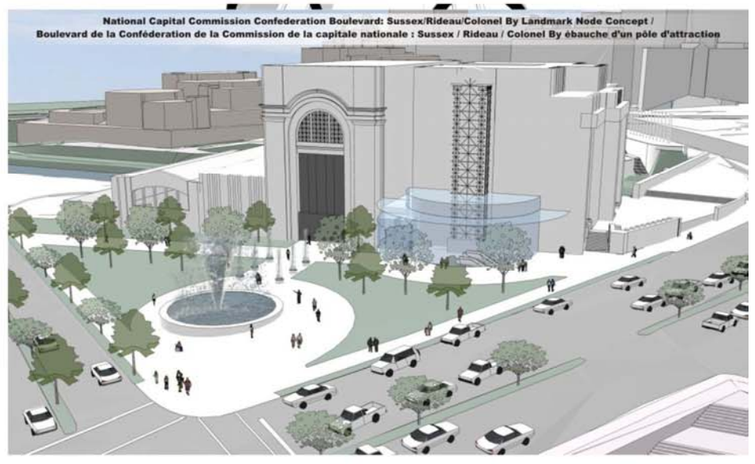
A third station entrance, located approximately mid-way along the LRT platform is shown conceptually on the accompanying station plans. This access point will require further design discussion with the NCC and carries with it the opportunity to integrate into the existing Government Conference Centre and/or proposed Sussex/Rideau/Colonel By Landmark Node to be located on the southwest corner of this intersection.




Fairmont Château Laurier
Parliament East Block / Édifice de l'Est
Welington
George
Pont Plaza Bridge
Potential station entry / Entrée potentielle de la station
National War Memorial / Mémorial national de guerre du Canada
The Bay
Sparks
Rideau
Station entry / Entrée de la station
Tunnel alignment / Tracé du tunnel
Government of Canada Conference Centre / Centre des conférence du gouvernement du Canada
Station entry (within Rideau Centre) / Entrée de la station (à partir du Centre Rideau)
Colonel By
Centre Rideau Centre
Queen
Canal Rideau Canal
Westin Hotel
Albert
Elgin
National Arts Centre / Centre national des Arts
Ottawa Convention Centre / Centre des congrès d'Ottawa


Centre Rideau Centre
Rideau
East concourse - potential access to Rideau Centre and/or The Bay / Zone de confluence est-accès potentiel au Centre Rideau et/on à The Bay


National Capital Commission Confederation Boulevard: Sussex/Rideau/Colonel By Landmark Node Concept /
Boulevard de la Confédération de la Commission de la capitale nationale : Sussex / Rideau / Colonel By ébauche d'un pôle d'attraction

## Rideau – Campus Runningway

East of Rideau Station, the tunnel alignment begins a curve to the south and east, passing under buildings located south of Rideau Street and west of Waller Street before reaching the existing Transitway alignment in the vicinity of the east end of the Mackenzie-King Bridge.

South of Mackenzie-King Bridge, the LRT alignment follows under the existing Transitway to a point approximately 200 m south of Laurier Avenue. Here, there is a sharp bend in the existing Transitway alignment to allow it to continue along the western boundary of the University of Ottawa Campus, on the east side of Nicholas Street. At this point, the tunnel alignment would depart from the existing Transitway alignment and continue southeast in a gentle curve, passing under Nicholas Street and following the alignment of Colonel By Drive along the east bank of the Rideau Canal to Campus Station. The design of this segment of the alignment requires further discussion with NCC and Parks Canada staff to ensure that any impacts to NCC land and the Rideau Canal zone are minimized.

The distance (1105 m) between Rideau Station and Campus Station requires that the design of this segment incorporate three cross-passageway connections between the running tunnels, to satisfy NFPA 130 requirements.

Once the project is complete, the existing Transitway alignment south of Laurier Avenue could be re-purposed. There is the potential to provide an additional landscape buffer between the University of Ottawa campus and Nicholas Street, and improved pedestrian and cycling routes through this area. There may be a need to maintain road access for service or emergency vehicles to enable them to reach the station entrances and vent shafts at Campus Station as well as buildings on the university campus.

### *Future LRT Extension*

The design of this runningway segment requires additional work at the preliminary design stage to address the feasibility of providing for a potential connection to a future LRT alignment continuing east along the Rideau/Montreal Road corridor, or north along King Edward Avenue to provide an interprovincial transit link. While neither of these facilities is identified in the City's current TMP protection for future linkages should be considered to allow flexibility in long-term decision making.

## Campus Station

Campus Station is proposed to be located in the vicinity of the existing Campus Transitway Station, but shifted to the west side of Nicholas Street to improve constructability, minimize impacts to transit operations during construction, and avoid closure of Nicholas Street. Station entrances and vent shafts would be located on the east side of Nicholas Street to minimize impacts to NCC lands and the Rideau Canal zone. The station will provide connections to the University of Ottawa, Sandy Hill and Golden Triangle (via the Corktown Footbridge).

The platform level of the station consists of a 180 m LRT platform in a centre-platform configuration, to accommodate 4-car trains initially and 6-car trains in the future. Passengers will exit the platform via one of two access points, located at north end and mid-point of the platform to reach a concourse level which spans over the LRT tracks and leads to stair, escalator and elevator connections to the surface.

Passengers exiting via the north station entrance will come to the surface north of the existing Transitway Station, adjacent to the University of Ottawa's new Vanier Hall building. This entrance will serve the northern part of the university campus. Additional underground connections to existing and future buildings on the campus could be provided to increase weather-protected connections to and from the LRT station.

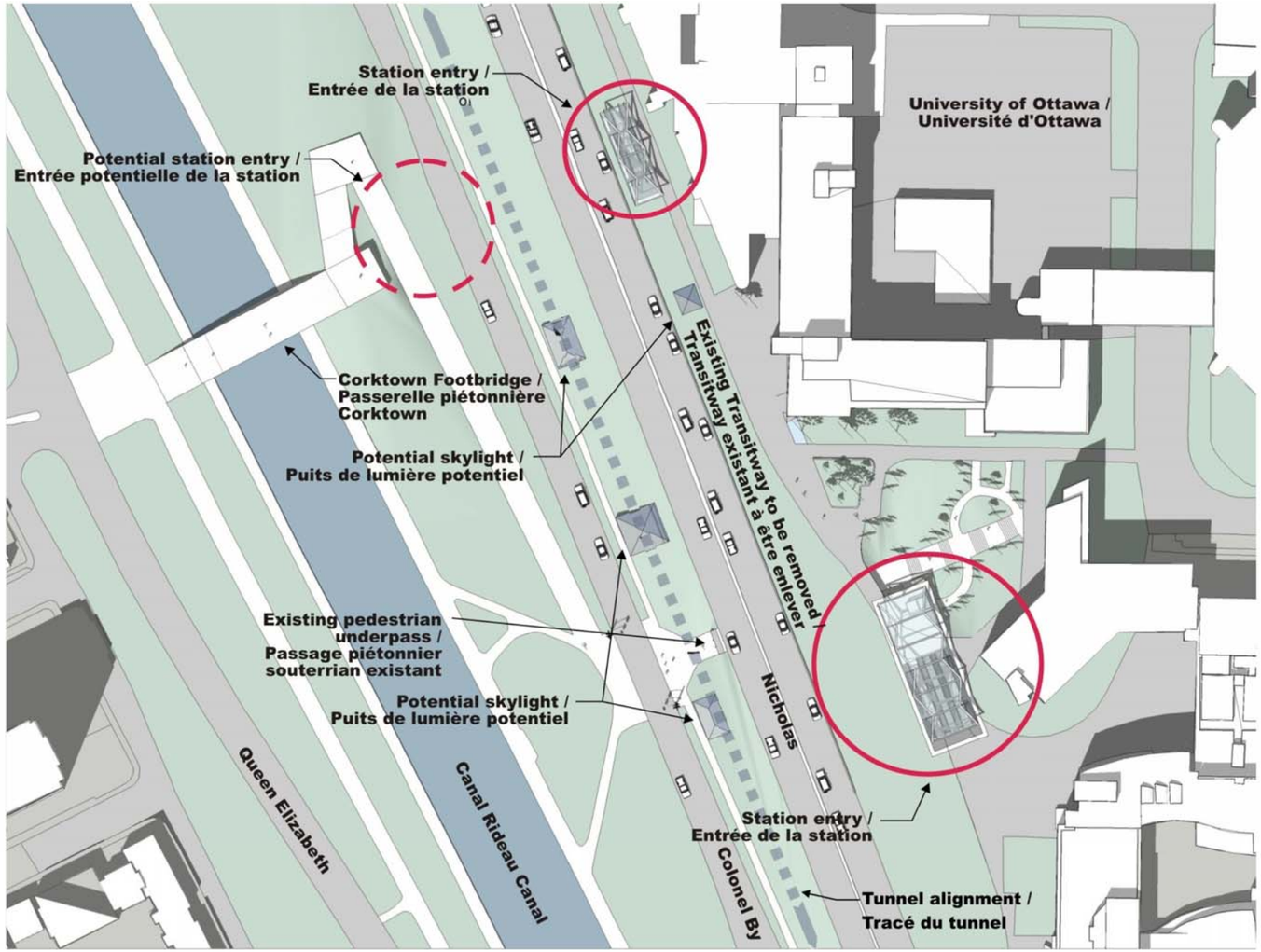
Passengers exiting via the south station entrance will come to the surface in the vicinity of the existing Transitway Station. This entrance will connect directly with the existing pedestrian underpass spanning under Nicholas Street. From here, pedestrians can turn left to reach the Rideau Canal and Corktown Footbridge, or turn right to enter the university campus or continue on to Somerset Street to reach the Sandy Hill community.

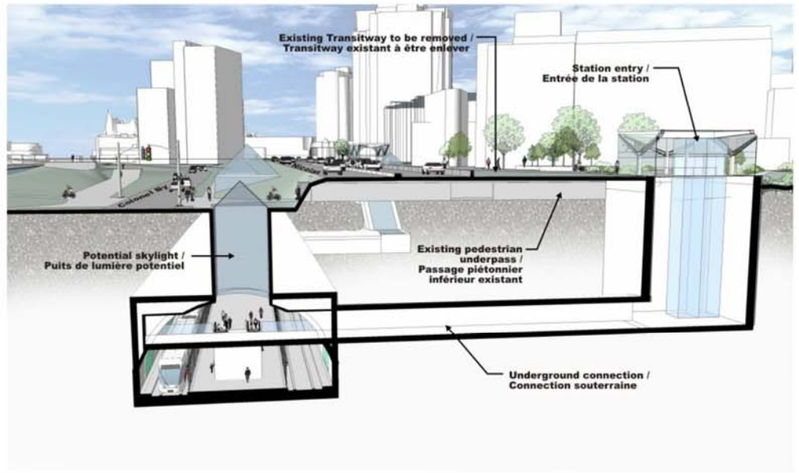
During public consultations on the recommended plan, strong support was given to providing an additional station entrance on the west side of Nicholas Street integrated with the Corktown Footbridge. This would provide a more direct connection for passengers originating or destined to the west side of the Rideau Canal. An underground connection from the area of the Corktown Footbridge to the north concourse level of the station is feasible and can be explored further at the preliminary design stage. Additional discussion is required with NCC and Parks Canada staff to ensure that impacts to NCC lands and the Rideau Canal zone are minimized.

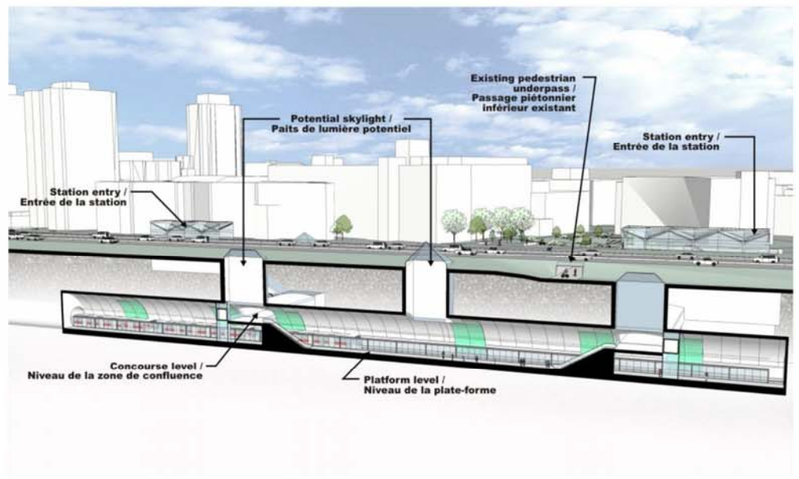
## Campus – Lees Runningway

South of Campus Station, the tunnel alignment curves back underneath Nicholas Street to follow under the existing Transitway alignment. Further work is required at the preliminary design stage to determine the tunnel construction method (cut and cover or TBM) for this segment of the alignment. After crossing under Mann Avenue, the alignment would exit the downtown transit tunnel via the East Portal, which will be located in the vicinity of the Transitway access to Robinson Avenue, north of Highway 417. South of the tunnel portal, the LRT alignment would follow the existing Transitway at-grade, passing under the existing Highway 417 westbound off-ramp and Highway 417 overpasses before entering Lees Station.

As with the existing Transitway alignment north of Campus Station, once the project is complete, the existing Transitway alignment between Campus Station and Mann Avenue could be re-purposed to provide a landscape buffer between the University of Ottawa campus and Nicholas Street, and improved pedestrian and cycling routes. The City of Ottawa Cycling Plan identifies a multi-use pathway along the existing Transitway alignment between the Corktown Footbridge and Lees Avenue.


Station entry /
Entrée de la station
Potential station entry /
Entrée potentielle de la station
Corktown Footbridge /
Passerelle piétonnière
Corktown
Potential skylight /
Puits de lumière potentiel
University of Ottawa /
Université d'Ottawa
Existing Transitway to be removed /
Transitway existant à être enlever
Existing pedestrian
underpass /
Passage piétonnier
souterrain existant
Potential skylight /
Puits de lumière potentiel
Queen Elizabeth
Canal Rideau Canal
Nicholas
Colonel By
Station entry /
Entrée de la station
Tunnel alignment /
Tracé du tunnel


Existing Transitway to be removed /
Transitway existant à être enlever
Station entry /
Entrée de la station
Potential skylight /
Puits de lumière potentiel
Existing pedestrian
underpass /
Passage piétonnier
inférieur existant
Underground connection /
Connection souterraine


Existing pedestrian
underpass /
Passage piétonnier
inférieur existant
Potential skylight /
Puits de lumière potentiel
Station entry /
Entrée de la station
Station entry /
Entrée de la station
Concourse level /
Niveau de la zone de confluence
Platform level /
Niveau de la plate-forme

## Lees Station

Lees Station serves adjacent residential development to the south and east of the station area, as well as the southern part of the Sandy Hill community. The station will remain in its current location and general configuration, with upgrades to existing station facilities incorporated as part of conversion to LRT.

LRT passengers will arrive on the lower level of the station, which will consist of 120 m LRT platforms in a side-platform configuration, expandable to 180 m long to accommodate 6-car trains in the future. The existing platform canopies will be removed and replaced with a new, fully enclosed platform canopy spanning over the LRT tracks. Due to the lower use nature of this station, the platform canopy may not extend for the full length of the LRT platforms.

Passengers exiting from platform level at the south end of the station will reach the upper level of the station at the existing station entrances. From here, pedestrians can turn left to walk over the Lees Avenue overpass of Highway 417 to reach Sandy Hill, turn right to reach existing apartment buildings and the residential neighbourhood east of the station or make connections to local buses travelling west along Lees Avenue, or cross Lees Avenue to enter the University of Ottawa Algonquin site or make connections to local buses traveling towards Sandy Hill. Passengers alighting from eastbound trains can also exit the platform level via the sidewalk connection alongside the existing Transitway access road, or turn right and proceed along an upgraded multi-use pathway along the south side of the LRT alignment back towards the University of Ottawa.

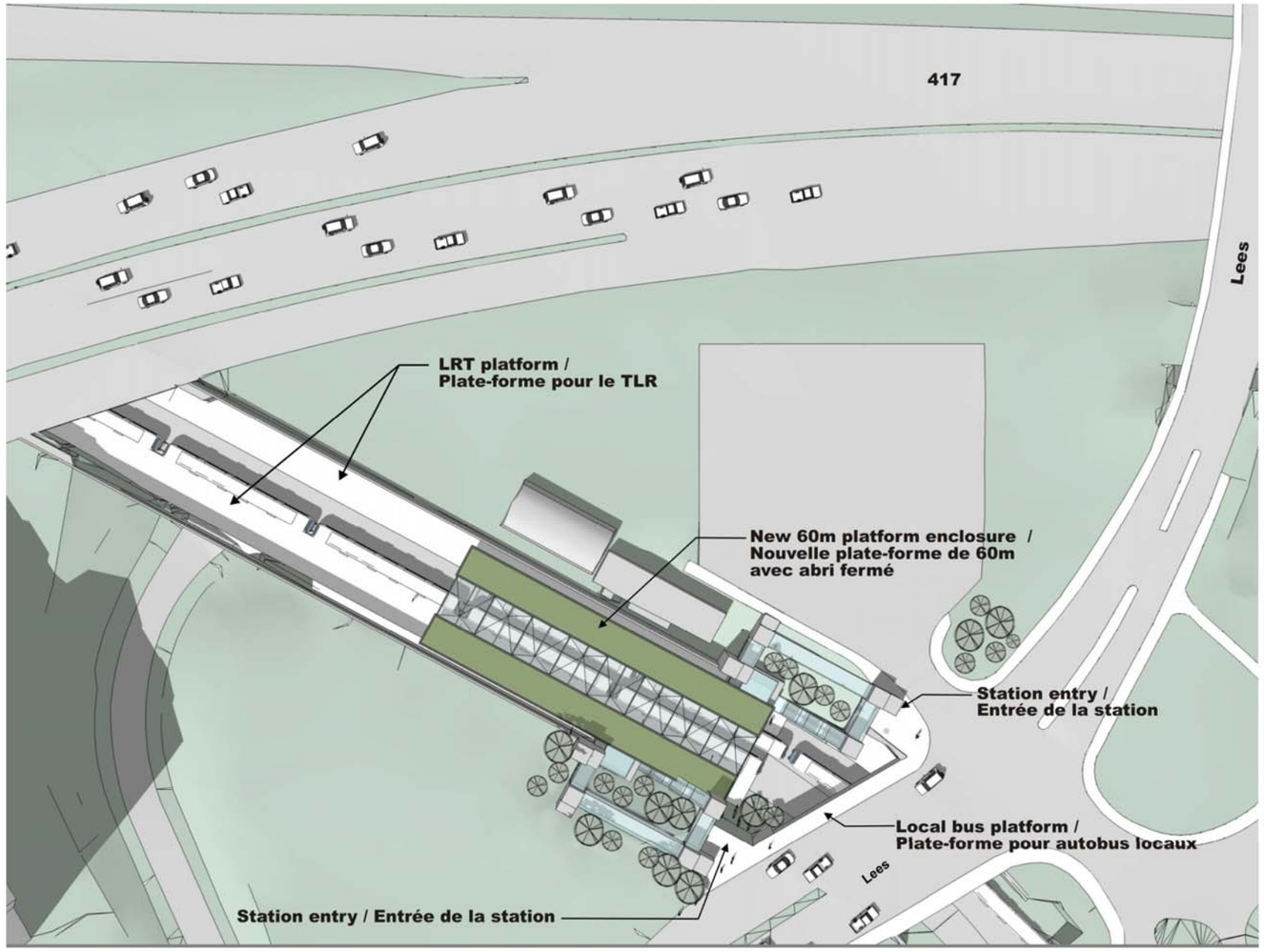
### *Development Integration Opportunities*

The station has the potential to be integrated into redevelopment of adjacent lands as envisaged in the Nicholas-Mann Gateway Precinct Design Plan, and also future redevelopment of University of Ottawa lands to the south.

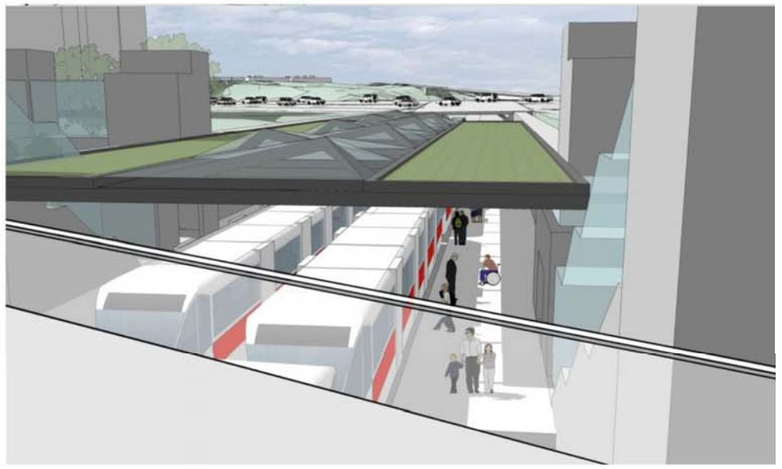
## Lees – Hurdman Runningway

South of Lees Station, the LRT alignment follows the existing Transitway, curving sharply to the right and rising up to cross over the Rideau River on the existing bridge structure. This bridge structure has been designed to accommodate conversion to LRT and should only require modifications to the deck of the structure to accommodate fixation of tracks and support poles for the OCS. This will be confirmed at the preliminary design stage. The existing multi-use pathways located on both sides of the bridge structure will remain, although improved barriers may be required to reduce the possibility of pedestrian intrusion onto the tracks and increase crash safety in case of a derailment in this area.

At the south end of the bridge, the LRT alignment curves to the east, away from the existing Transitway and onto an elevated fill structure before entering Hurdman Station.

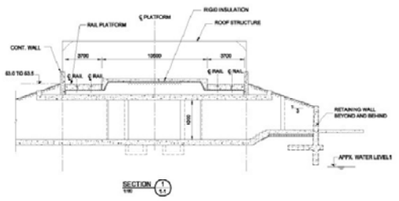

417
Lees
LRT platform /
Plate-forme pour le TLR
New 60m platform enclosure /
Nouvelle plate-forme de 60m
avec abri fermé
Station entry /
Entrée de la station
Local bus platform /
Plate-forme pour autobus locaux
Lees
Station entry / Entrée de la station


417
417
Station entry /
Entrée de
la station
Station entry /
Entrée de
la station
Lees



## Hurdman Station

Hurdman Station will be a major transfer point between the DOTT and the existing Southeast Transitway as well as local bus services serving communities to the north, east and south of the station. The LRT platforms will be located on an elevated fill structure north of the existing station, with a single-sided bus platform provided at-grade along the north side of the existing eastbound bus driveway. This design minimizes disruption during construction and reduces costs and constraints associated with building overtop of the existing landfill and methane containment system which sit under the existing Hurdman Station. After construction, the existing centre-island bus platform will be demolished,




with the space converted to provide bus lay-up and turnaround facilities. The existing bus lay-up space to the east of the station could be re-purposed for other uses, such as an enhanced passenger pick-up and drop-off facility.

LRT passengers will arrive on the upper level of the station, which will consist of an elevated 120 m LRT platform in a centre-platform configuration, expandable to 180 m long to accommodate 6-car trains in the future. A fully enclosed canopy would cover the LRT platform to protect passengers from inclement weather. Passengers will exit the platform via one of two access points located at either end of the platform to reach a concourse level which spans under the LRT tracks, providing connections to the relocating bus platforms and to future development land located north of the station currently owned by the NCC. Existing pedestrian and cycling linkages around the station area will be maintained to provide connections to/from and through the station area.

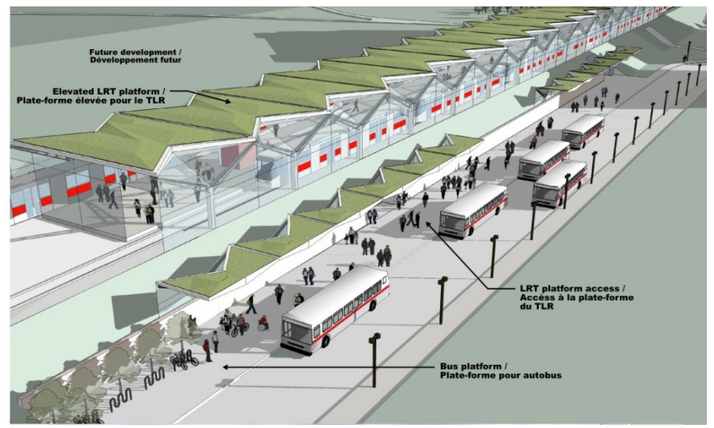
As part of the design optimization, the elevation of the tracks was lowered 1 metre, requiring that passengers accessing the station descend to the connecting tunnels and then rise up to the bus platform level. This would be accomplished with stairs and ramps for full accessibility. This height reduction significantly reduces the volume of fill material and the property required for the station.

### *Development Integration Opportunities*

There is a significant opportunity to integrate the station with future NCC development lands located to the north of the station. As mentioned above, direct pedestrian connections will be provided from these lands into the concourse level of the station. The elevated fill structure which supports the LRT platforms and alignment through the station can be built up against in the future, with retaining walls used to reduce the slope of the embankment.

### *Future LRT Extension*

Although not identified in City's TMP, the ability of the station design to accommodate future conversion of the Southeast Transitway to LRT was considered during the development of alternative station options and rejected. Given the constraints around this station (contaminated




soil, need to maintain NCC development land) and the need to protect for future 180 m platforms, it would be very difficult to design a station which could easily accommodate both LRT lines within a single structure.

As with Bayview Station, fully-grade separated track junctions are desirable to maintain operations, as opposed to a "flat" junction between rail lines which requires trains to cross opposing tracks. Should future conversion of the Southeast Transitway be pursued, separate platforms for this LRT corridor will be required, and while a track connection for non-revenue movement of trains (which can accommodate reduced curve radii) could be provided, it is not likely that a "direct to downtown" service could be provided without significant cost or impacts to NCC development lands north of the station.

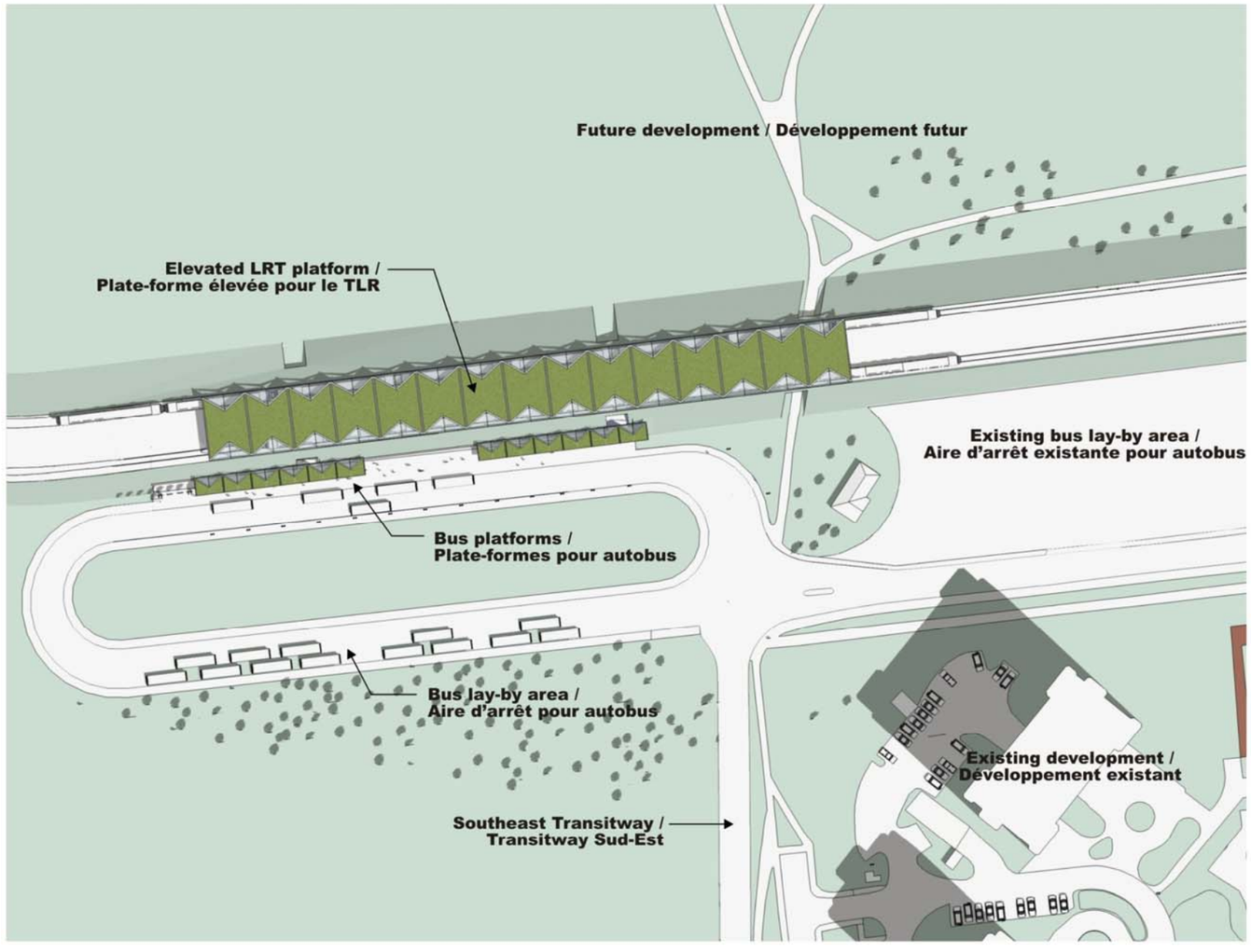
## Hurdman – Train Runningway

East of Hurdman Station, the LRT alignment remains on an elevated fill structure, allowing for an additional multi-use pathway underpass immediately to the east of the station, and a roadway underpass accommodating an

extension of Industrial Avenue to provide road access to the NCC development lands located north of the LRT alignment. To support LRT operations, a pocket track will be provided east of Hurdman Station to allow turn back of trains and temporary storage of disabled or out of service trains.

West of the future Industrial Avenue extension overpass, the LRT alignment curves to the north and then east, maintaining a flat grade and merging back into the existing Transitway alignment (which climbs up to cross over Riverside Drive) west of the Riverside Drive overpass. Additional work is required at the detailed design stage to address mitigation of impacts which the elevated fill structure may have to existing major (1200 mm) watermains crossing the LRT alignment in the vicinity of the Hurdman Pumping Station.

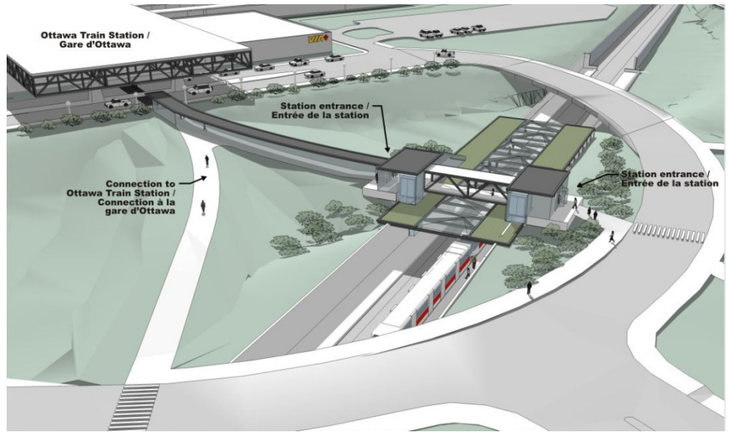
The LRT alignment crosses over Riverside Drive, re-using the existing Transitway overpass structure before curving to the northeast and descending into Train Station.


Future development / Développement futur
Elevated LRT platform /
Plate-forme élevée pour le TLR
Existing bus lay-by area /
Aire d'arrêt existante pour autobus
Bus platforms /
Plate-formes pour autobus
Bus lay-by area /
Aire d'arrêt pour autobus
Existing development /
Développement existant
Southeast Transitway /
Transitway Sud-Est


Pedestrian connection /
Connection piétonnière

## Train Station

Train Station provides important connections to intercity (VIA) passenger rail service and to potential commuter rail service. A planned pedestrian overpass north of the station area will span over Highway 417, connecting Train Station with development on the north side of the highway, including the Ottawa Baseball Stadium and the Overbrook community.




The design of the existing Transitway station cannot accommodate conversion to LRT as an insufficient length of tangent (straight) track to accommodate the required 120 m LRT platforms (or protect for future 180 m platforms) can be provided. The alignment of the new LRT station has therefore been shifted north of the existing Transitway station and designed to eliminate the existing curves west and east of the station. The existing BRT platforms, pedestrian overpass, Tremblay Road and east station driveway bridge structures will need to be demolished, with new LRT platforms and overpass structures built along the revised LRT alignment. The existing west station driveway bridge can be maintained, which will allow access into the VIA rail station to be maintained during construction.

LRT passengers will arrive on the lower level of the station, which will consist of two 120 m LRT platforms in a side-platform configuration, expandable to 180 m to accommodate 6-car trains in the future. A fully enclosed platform canopy spanning over the LRT tracks will be constructed, however due to the lower use nature of this station, the platform canopy may not extend for the full length of the LRT platforms.

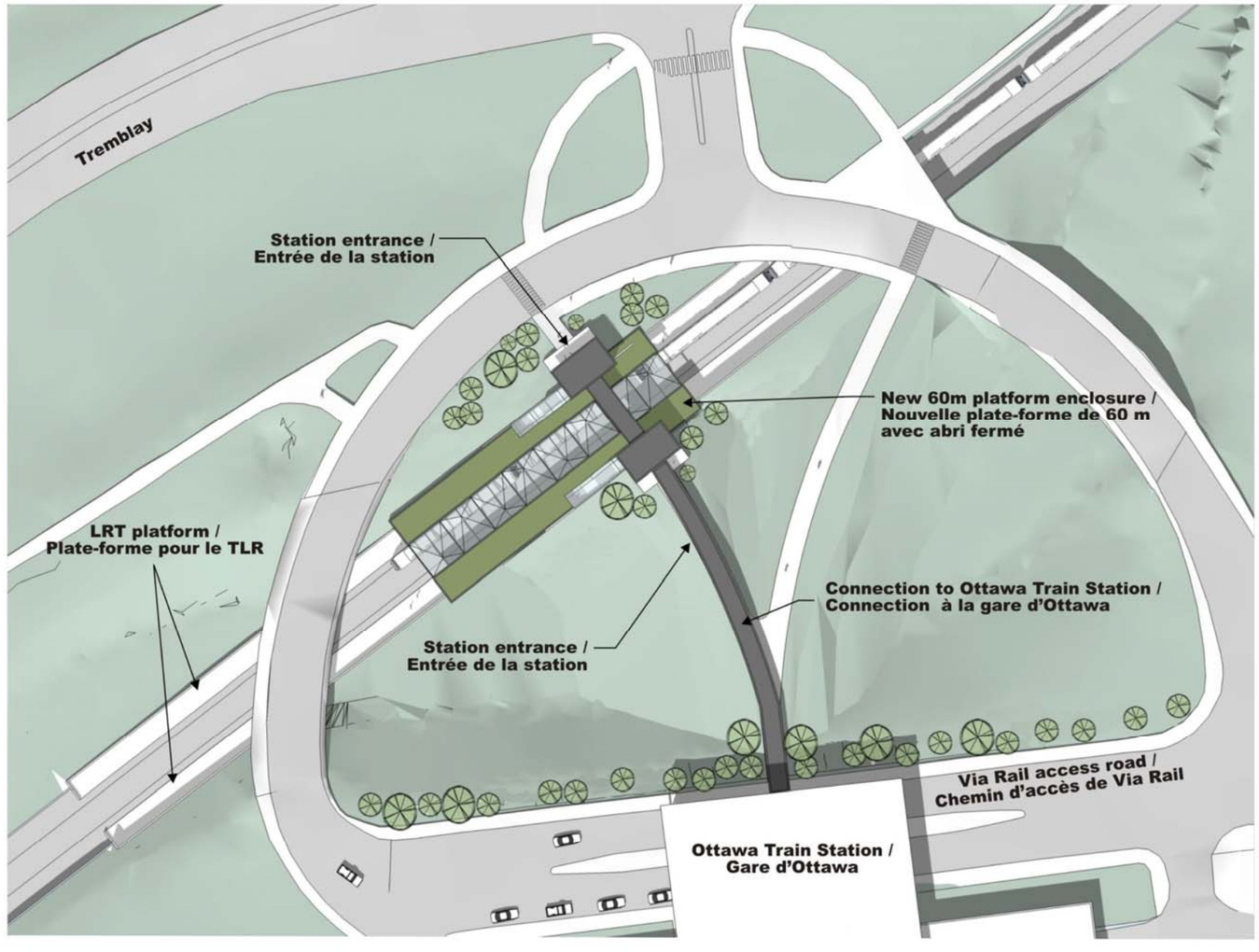
Passengers exiting from platform level will come to the surface within a new station entrance building which will be located within the central lawn area in front of the VIA Rail Station. From here, pedestrians can access the VIA Rail Station through a weather-protected walkway leading to the station driveway or they can walk north to Tremblay Road to reach employment lands located to the east of the station. In the future, they will be able to cross Tremblay Road at the existing signalized Tremblay/Station Access Driveway intersection and use the planned pedestrian overpass across Highway 417 to reach development and residential communities on the north side of the Highway.

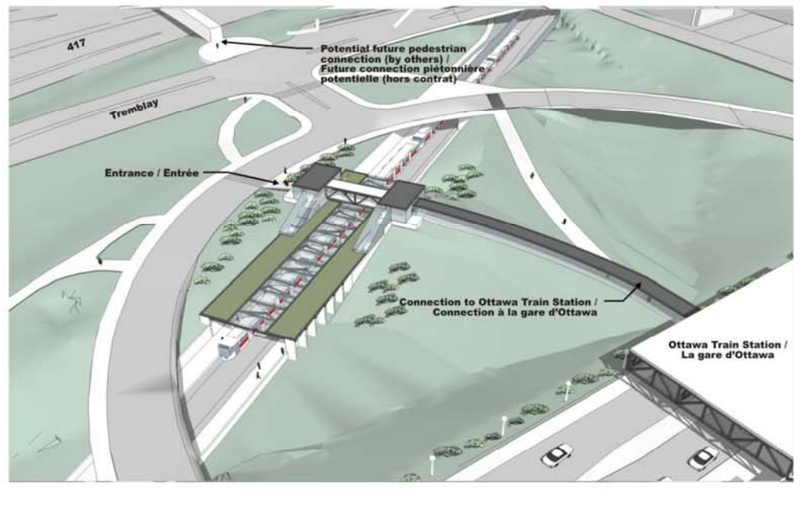
An additional pedestrian connection to the east end of the station platforms will be investigated further at the detailed design stage. This access would provide a grade-separated link to the north side of Tremblay Road via an existing pedestrian pathway.

## Train – St. Laurent Runningway

After leaving Train Station, LRT trains will pass under a reconstructed Tremblay Road overpass and curve to the east in order to follow the existing Transitway alignment which is located in an open cut along the south side of Highway 417. The existing Transitway access road adjacent to the north side of the Tremblay Road overpass could be re-purposed to provide access to the LRT corridor for service or emergency vehicles.

In the vicinity of the Belfast Road overpass, a junction with the connecting tracks for the Maintenance and Storage Facility will be provided. This will consist of single cross-over tracks and turnouts in the eastbound and westbound directions to enable trains to enter or exit the mainline from either direction. East of the connecting track junction the LRT alignment continues along the existing Transitway, descending and then curving north to pass under Highway 417 and enter the lower (underground) level of the existing St. Laurent Station, which is between the north side of Highway 417 and the St. Laurent shopping centre.


Tremblay
Station entrance /
Entrée de la station
New 60m platform enclosure /
Nouvelle plate-forme de 60 m
avec abri fermé
LRT platform /
Plate-forme pour le TLR
Station entrance /
Entrée de la station
Connection to Ottawa Train Station /
Connection à la gare d'Ottawa
Via Rail access road /
Chemin d'accès de Via Rail
Ottawa Train Station /
Gare d'Ottawa


417
Potential future pedestrian
connection (by others) /
Future connection piétonnière
potentielle (hors contrat)
Tremblay
Entrance / Entrée
Connection to Ottawa Train Station /
Connection à la gare d'Ottawa
Ottawa Train Station /
La gare d'Ottawa

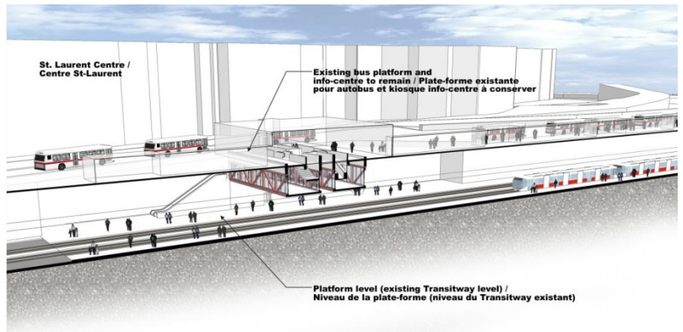
## St. Laurent Station

St. Laurent Station serves an established major retail development (St. Laurent Shopping Centre) and provides for transfers to local bus services via an upper level bus terminal. The station will remain in its current location and general configuration, with upgrades to existing station facilities incorporated as part of conversion to LRT. Additional investigation is required at the preliminary design stage to address an existing storm sewer running under the Transitway through the station, but the proposed alignment of the LRT tracks through the station should provide sufficient clearance to accommodate this utility without the need for relocation. Ventilation requirements as part of the conversion of the station from BRT to LRT will also need to be reviewed.

LRT passengers will arrive on the lower level of the station, which will consist of 120 m long LRT platforms in a side-platform configuration, with protection allowed for future extension to provide 180 m long platforms. Passengers exiting from the platforms will reach the concourse level at the existing access points. From this level they can access directly the St. Laurent shopping centre or continue up to the upper level bus platforms which will remain to accommodate local bus service. The existing pedestrian walkway leading from the west end of the stations' lower level to the north side of Tremblay Road will be maintained.

### *Development Integration Opportunities*

The adjacent shopping centre has submitted plans for a major expansion which will further support transit ridership. Additionally, PWGSC is preparing development plans for a major employment node located on lands located adjacent to the station site, south of The Queensway. Part of this proposal would involve construction of a direct pedestrian connection from these lands to the upper level of St. Laurent Station.

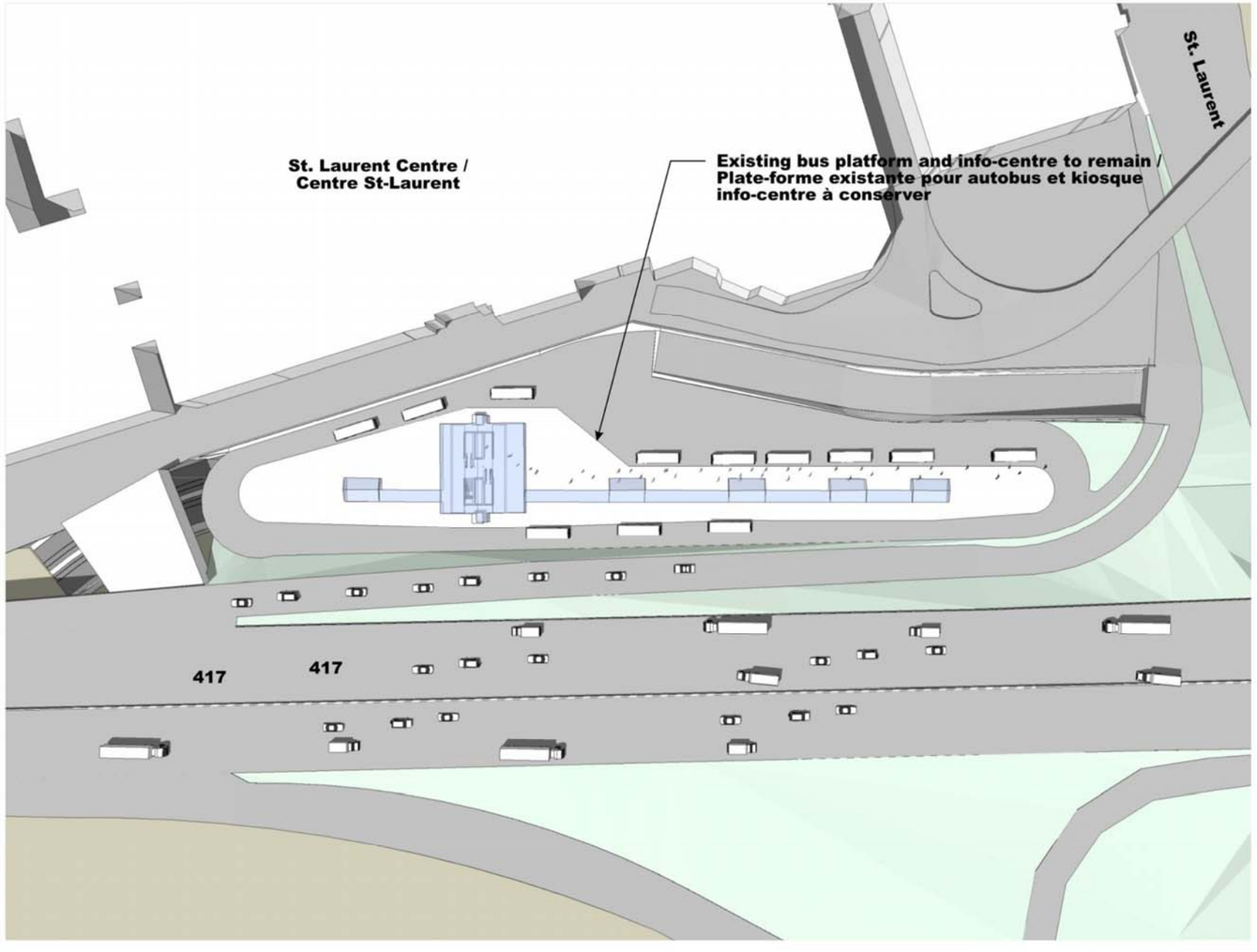


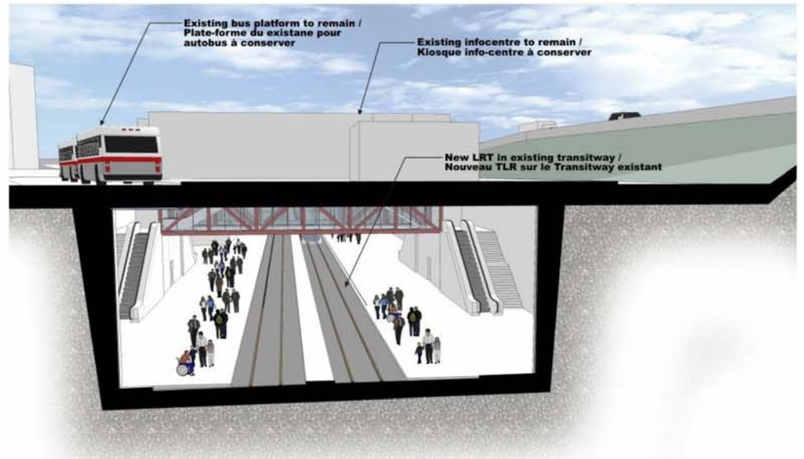

## St. Laurent – Cyrville Runningway

East of St. Laurent Station, the LRT alignment will remain on the existing Transitway corridor, passing under bridges carrying St. Laurent Boulevard and access ramps for the Highway 417/St. Laurent interchange. The existing grade then climbs up to match the surrounding ground level, following along the north side of the Queensway until descending again and curving to the north before entering Cyrville Station.

An existing Transitway access point east of St. Laurent Boulevard, which currently provides connections for buses accessing the upper level bus platforms at St. Laurent Station could be maintained to provide emergency or service vehicle access to the LRT corridor.

An additional Transitway access point further to the east, at Michael Street would be closed off.


St. Laurent Centre /
Centre St-Laurent
Existing bus platform and info-centre to remain /
Plate-forme existante pour autobus et kiosque
info-centre à conserver
St. Laurent
417
417


Existing bus platform to remain /
Plate-forme du existane pour
autobus à conserver
Existing infocentre to remain /
Kiosque info-centre à conserver
New LRT in existing transitway /
Nouveau TLR sur le Transitway existant

## Cyrville Station

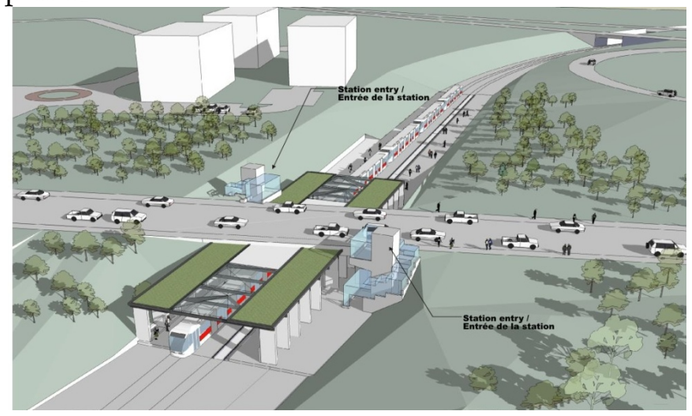
Cyrville Station serves adjacent residential development to the north of the station area, as well as employment uses to the west and south. The station will remain in its current location and general configuration, with upgrades to existing station facilities incorporated as part of conversion to LRT. The station design and alignment is also compatible with proposed plans to upgrade the highway interchange as a result of the Interprovincial Bridge Crossing Study (as presented to date).

LRT passengers will arrive on the lower level of the station, which will consist of 120 m LRT platforms in a side-platform configuration, with protection allowed for future extension to provide 180 m platforms to accommodate 6-car trains. The existing platform canopies will be removed and replaced with a new, fully enclosed platform canopy spanning over the LRT tracks. Due to the lower use nature of this station, the platform canopy may not extend for the full length of the LRT platforms.

Passengers exiting from platform level at the west end of the station will reach the upper level of the station at the existing station entrances. From here, pedestrians can walk north along Cyrville Road to reach existing office and residential developments, or south along Cyrville Road to reach industrial developments located south of Highway 417. Passengers alighting from westbound trains can also exit the platform level via the sidewalk connection at the extreme west end of the platform to reach office developments located to the west of the station.

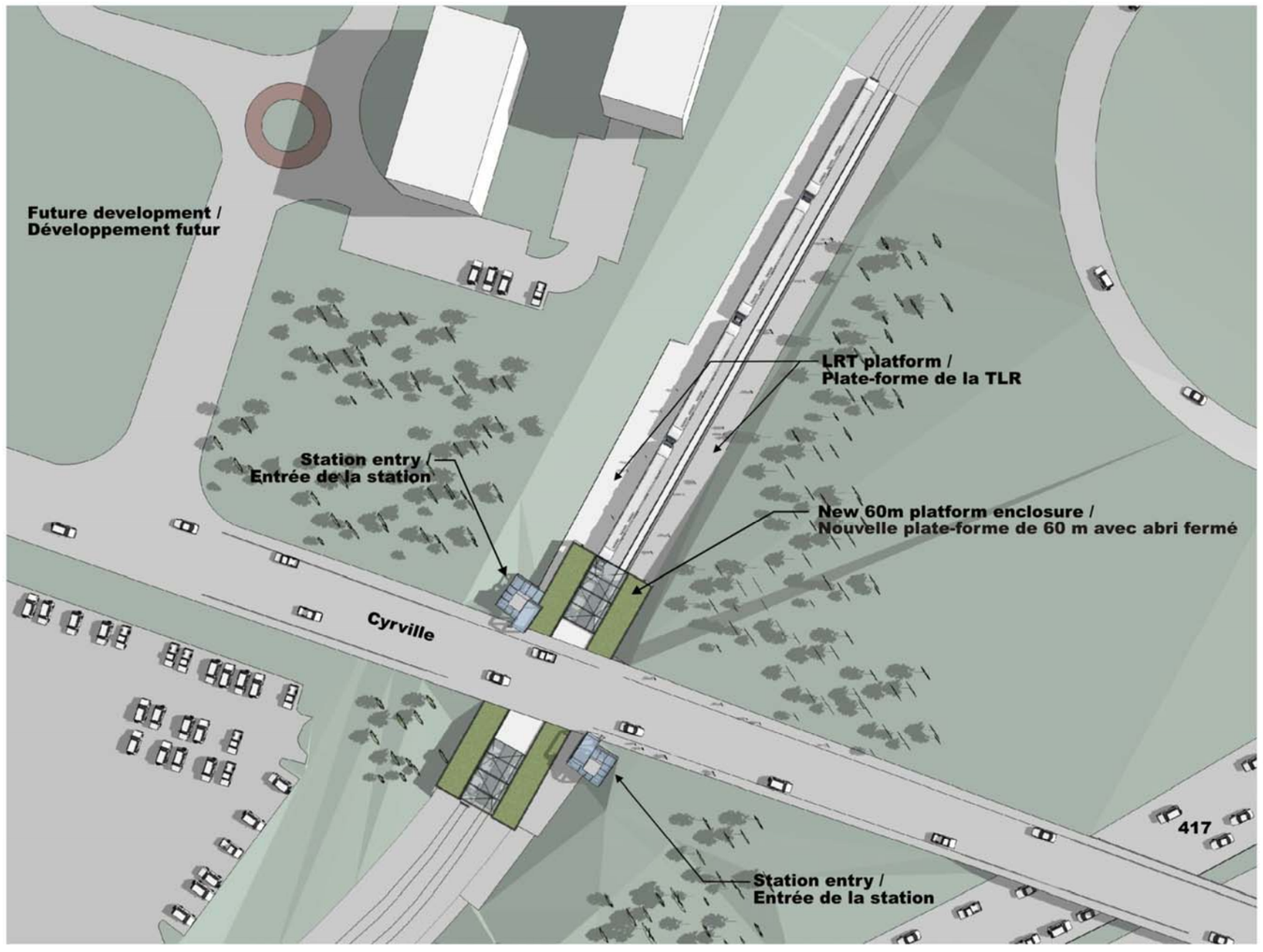
### *Development Integration Opportunities*

Build-out of planned residential development to the north (Place des Goveneurs) will support transit ridership at this location, and there is the potential for a direct pedestrian connection from this development to the westbound LRT platform. There is also redevelopment potential within the adjacent office development complex (Queensway Corporate Campus) located to the west of station, which enjoys a direct pedestrian link into the station from the westbound platform.




## Cyrville – Blair Runningway

Leaving Cyrville Station, LRT trains will continue along a converted Transitway alignment, passing under bridges carrying the southbound and northbound lanes of the Aviation Parkway. As mentioned previously, the alignment is through this area is compatible with proposed plans to modify the adjacent Highway 417/Aviation Parkway/OR 174 interchange to support the proposed Kettle Island Interprovincial Bridge Crossing (as presented to date). East of the highway interchange, the LRT alignment follows along the north side of OR 174 before entering Blair Station. A pocket track will be provided to the west of Blair Station in order support LRT operations by accommodating temporary storage of disabled or out of service trains.


Future development /
Développement futur
LRT platform /
Plate-forme de la TLR
Station entry /
Entrée de la station
New 60m platform enclosure /
Nouvelle plate-forme de 60 m avec abri fermé
Cyrville
417
Station entry /
Entrée de la station

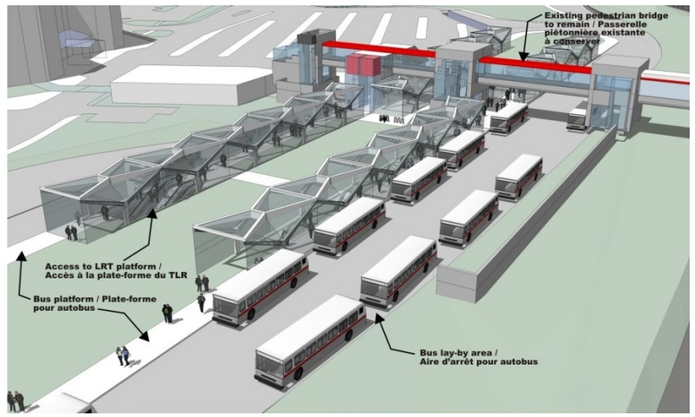
## Blair Station

Blair Station will serve as the eastern terminus of the DOTT and accommodate transfers from BRT service from the east (existing East Transitway and future Cumberland Transitway) and local bus services. The station also serves a major retail development (Gloucester Centre) located immediately adjacent to the station site, as well as office developments to the east and south (linked via a pedestrian bridge over OR 174). The design of the station incorporates an upper level to accommodate expanded bus platforms serving BRT and local services, and a lower level to accommodate new LRT platforms.

LRT passengers will arrive on the lower level of the station, which will consist of a 120 m long LRT platform in a centre-platform configuration, with protection allowed for future extension to provide 180 m long platform. Passengers will exit the LRT platform via one of two access points located at either end of the platform to reach the upper level of the station, which consists of a large centre-island bus platform which spans over the LRT platforms below. From here, passengers can transfer to BRT buses serving Orléans via the East Transitway or future Cumberland Transitway, and local buses serving communities to the north and south of Blair Station. Passengers wishing to exit the station to reach the Gloucester Centre shopping mall or office developments south of Highway 417 can access the existing pedestrian bridge spanning over the station area, which will be rehabilitated and re-used.

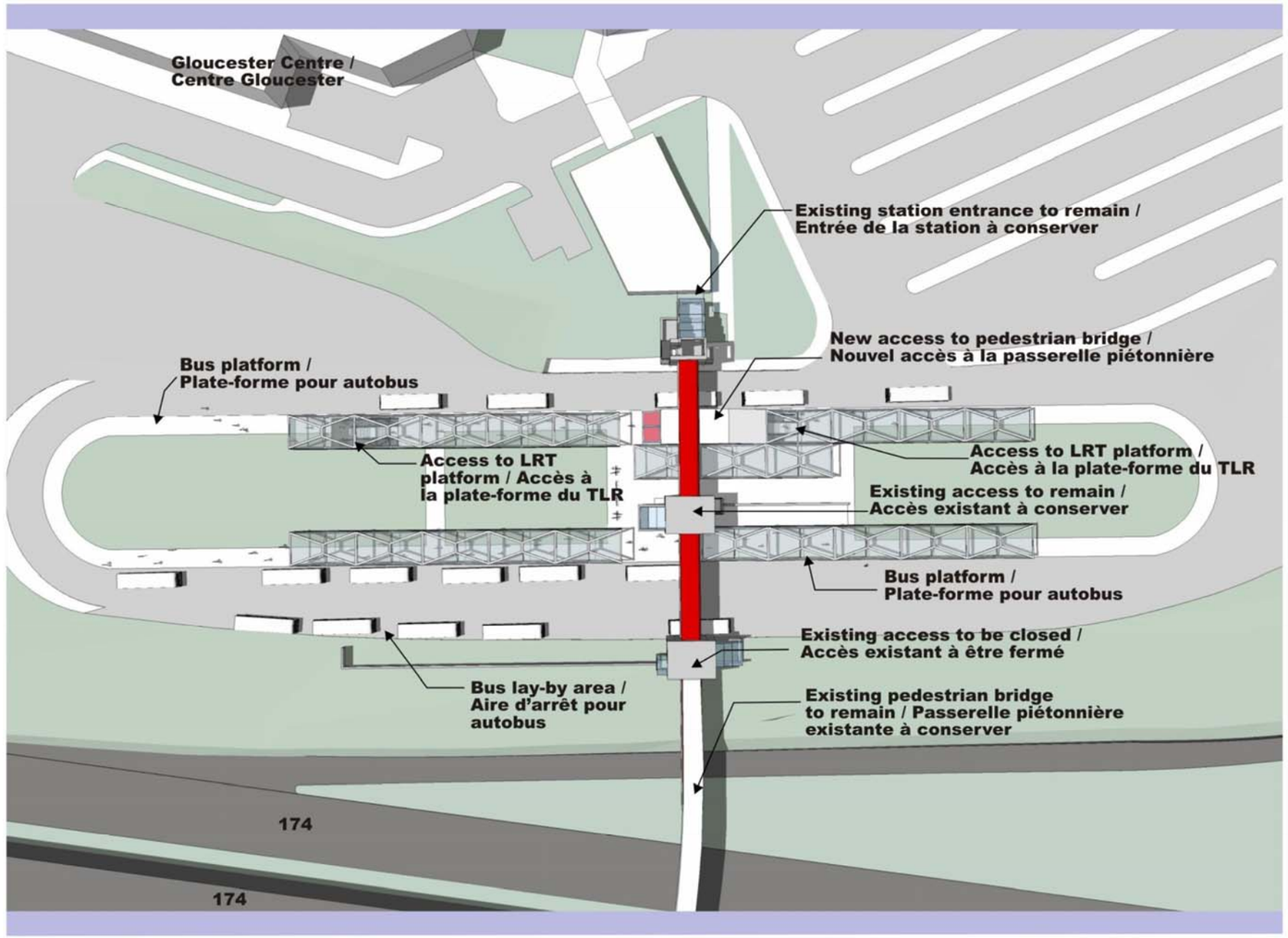
### *Development Integration Opportunities*

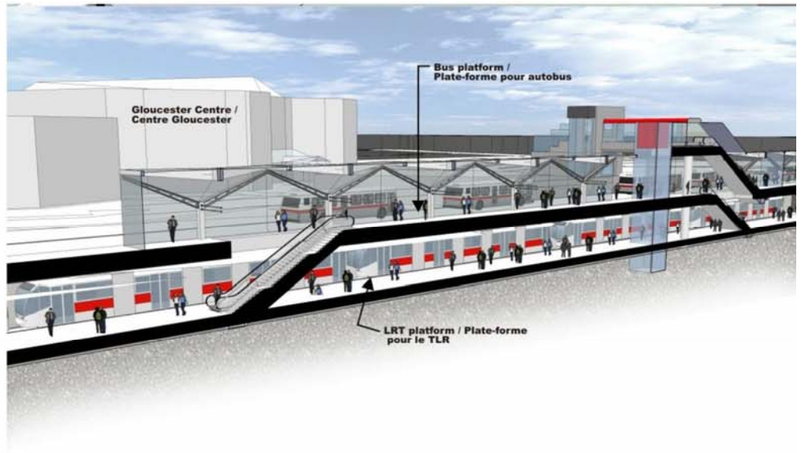
There is potential for an expansion of the Gloucester Centre shopping mall to integrate into the new station by building over the existing mall access driveway and parking lot which separates the Gloucester Centre from Blair Station.

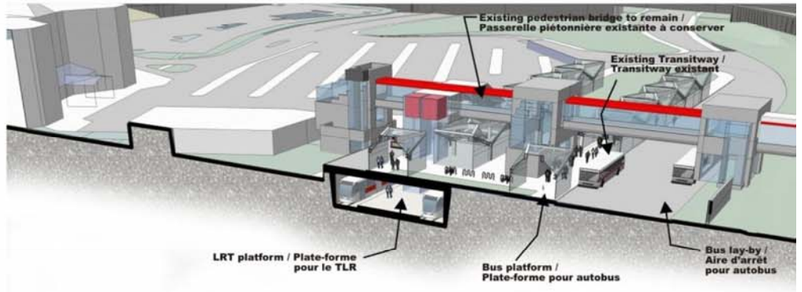



### *Future LRT Extension*

The City of Ottawa's current Transportation Master Plan does not identify expansion of LRT east of Blair station as occurring until after 2031. The design of the station accommodates future extension of LRT to the east as the alignment of the lower level LRT platform and tracks line up with existing Transitway alignment as it passes under Blair Road, enabling future conversion of the east Transitway to proceed in a cost-effective manner. The upper level bus platforms would be unaffected and bus access maintained from Blair Road via the existing bus driveway and shared mall entrance.


Gloucester Centre /
Centre Gloucester
Existing station entrance to remain /
Entrée de la station à conserver
New access to pedestrian bridge /
Nouvel accès à la passerelle piétonnière
Bus platform /
Plate-forme pour autobus
Access to LRT
platform / Accès à
la plate-forme du TLR
Access to LRT platform /
Accès à la plate-forme du TLR
Existing access to remain /
Accès existant à conserver
Bus platform /
Plate-forme pour autobus
Existing access to be closed /
Accès existant à être fermé
Bus lay-by area /
Aire d'arrêt pour
autobus
Existing pedestrian bridge
to remain / Passerelle piétonnière
existante à conserver
174
174


Bus platform /
Plate-forme pour autobus
Gloucester Centre /
Centre Gloucester
LRT platform / Plate-forme
pour le TLR


Existing pedestrian bridge to remain /
Passerelle piétonnière existante à conserver
Existing Transitway /
Transitway existant
LRT platform / Plate-forme
pour le TLR
Bus platform /
Plate-forme pour autobus
Bus lay-by /
Aire d'arrêt
pour autobus

## Maintenance and Storage Facility

The proposed Maintenance and Storage Facility is an integral part of the project, as it will:

- House and service all of the trains needed to operate the line
- Service vehicles to be used on future LRT lines
- House the operations control centre (signalling, communications) for the line
- Be the primary heavy maintenance facility for the LRT network

Maintenance of the LRVs is crucial to maintain vehicle manufacturer's warranties, minimize long term operating costs and provide for system safety and reliability. The Maintenance and Storage Facility will accommodate the following elements on-site:

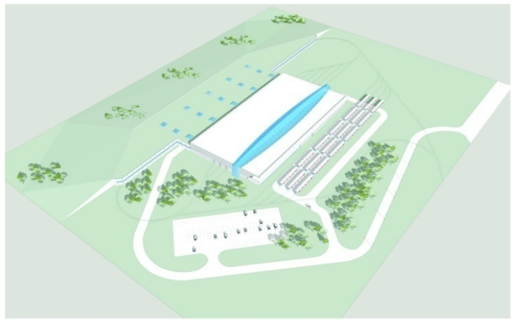
- Main facility building housing offices, roster areas, meeting rooms and control equipment;
- Storage yard for regular cleaning and minor maintenance
- Repair areas for heavy and light maintenance areas for vehicles
- Workshop area with a suite of tools and equipment tailored for vehicle types
- LRT control centre (signalling, communications, security)
- Cleaning area for interior cleaning of vehicles
- Train wash for exterior washing of vehicles
- Electrical substation to local power supply for facility and trains
- Turnaround loops providing the ability to work vehicles from either end and equalize wear and tear

Track redundancy within the facility will be provided to ensure the ability to move LRVs under vehicle or system failure conditions.

The preferred site for the Maintenance and Storage Facility has been determined based on the following criteria:

- Site Characteristics (topography, grade, land use compatibility, expansion capability and environmental considerations),
- Facility Operations (turnaround loops, track redundancy, layout efficiency and municipal services)
- System Operations (connectivity to the line, efficiency and access to freight rail), and
- Relative Costs (capital, operating, maintenance and property ownership and acquisition)

The proposed Maintenance and Storage Facility for the DOTT project will be located on lands to the west of the existing OC Transpo headquarters and bus maintenance facility located on the north side of Belfast Road, west of St. Laurent Boulevard and south of the VIA rail corridor. In order to access this location, a connecting track is required between the DOTT alignment and the Maintenance and Storage Facility. This connecting track will tie into the LRT mainline in the vicinity of Belfast Road and proceed south in a cut and cover tunnel, passing under Tremblay Road and the VIA Rail corridor before surfacing on the north side of Belfast Road to enter the Maintenance and Storage Facility.



Architectural Rendering /
*Rendu d'architecture*

Architectural Rendering /
*Rendu d'architecture*

A parcel of land of approximately 12 hectares is required to accommodate all necessary functions to operate and support the project. The preferred site requires property that is not under the ownership and control of the City. Negotiations are required to proceed with the preferred option.

## Implementation

Implementation of the project will include the following major tasks:

- Conversion of existing Transitway segments and stations
- Construction of new at-grade LRT segments and stations
- Construction of new elevated LRT segments and stations
- Construction of new underground LRT segments and stations
- Construction of a new Maintenance and Storage Facility
- Testing and commissioning of the new LRT system
- Transit operations during and after construction

### Construction Methods

The varying conditions along the corridor and the introduction of the tunnel will require that several different construction methods be used to complete the project. The following is an overview of the different construction methods that are likely to be used in completing the project.

### Conversion of Existing Transitway Segments and Stations

Construction of the project includes the conversion of approximately 9 km of existing Transitway from BRT to LRT technology. Where existing grade and alignment do not need to be altered, it is proposed that tracks for the LRT be laid over top of existing pavement on a layer of ballast. This method is used increasingly in the construction of heavy rail corridors to provide a solid road base. Existing catch basins could be re-used as existing drainage would remain, with screens placed over the catchbasin lids to prevent ballast from washing away. Changes to existing drainage would be required where existing Transitway elevation requires modification (e.g. to increase overhead clearances at structures).

At Transitway stations which will be remaining largely in their current configuration, existing platforms will be lengthened and widened, with the LRT tracks placed in the centre by-pass lanes. Tracks will be fixed to a concrete slab through the station areas to assist with maintenance. Station elevators and amenities will be upgraded. Existing station canopies and shelters will be removed and replaced with fully enclosed platform canopies spanning over the platforms and tracks.

### Construction of At-Grade Segments and Stations

In segments where the LRT alignment deviates from the existing Transitway (e.g. in the vicinity of Train and LeBreton Stations), new at-grade LRT corridors will need to be constructed. Where possible, activities will be timed to allow continued operation of the existing Transitway to continue as long as possible during construction. At-grade sections will employ typical track on tie and ballast, with a sub-grade to provide drainage.

At-grade runningway segments will have ballasted track, except in the station areas where track will be fixed to a concrete slab to assist with maintenance. New platforms and station facilities (entrance buildings, stairs, escalators and elevators) will be constructed. Fully enclosed platform canopies spanning over the platforms and tracks will be provided.

### Construction of Elevated Segments and Stations

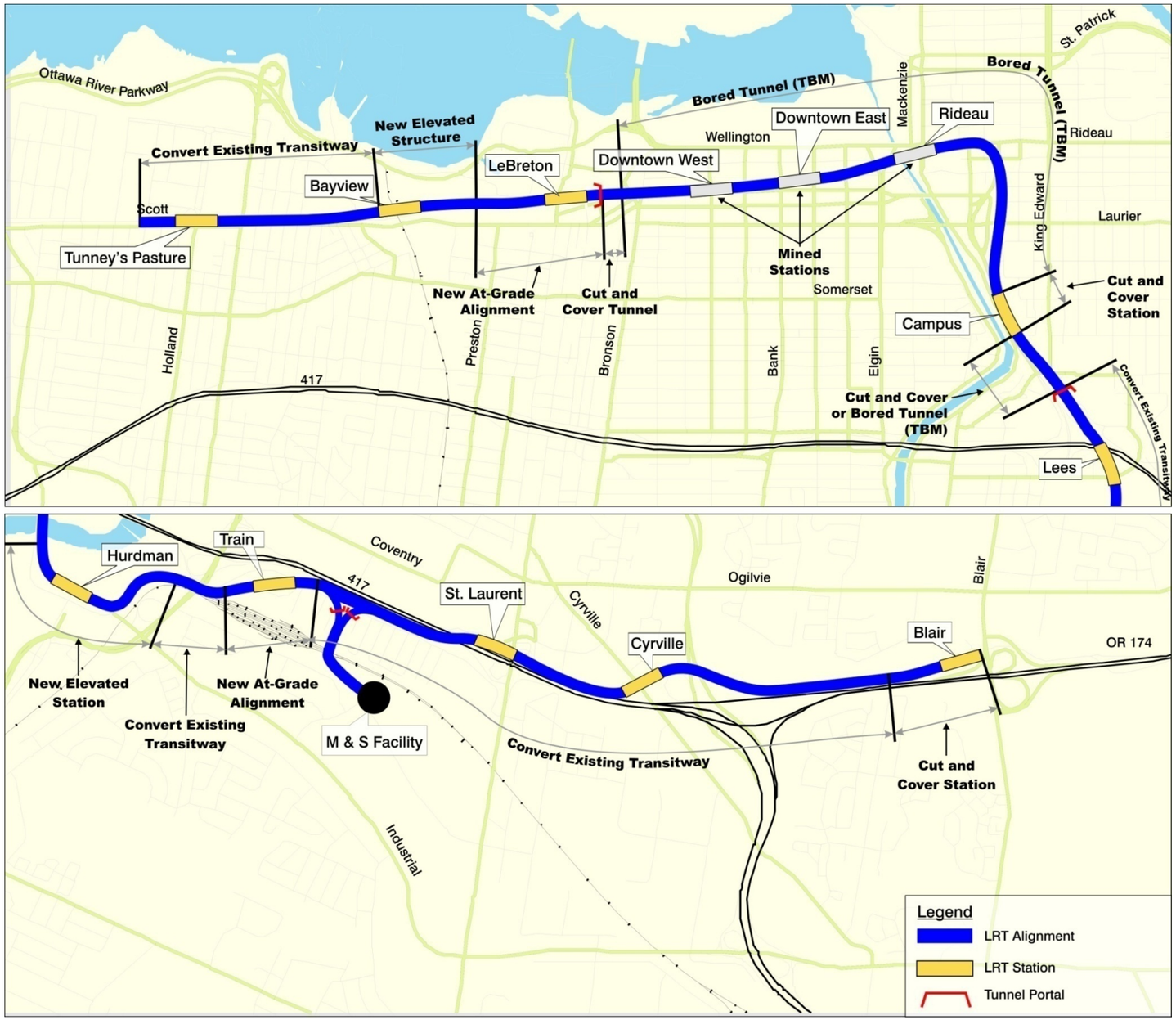
Elevated LRT segments will be constructed at Bayview and Hurdman Stations.

In the vicinity of Bayview Station, the existing Transitway corridor is on an elevated alignment consisting of a retained fill structure, an overpass spanning the O-Train corridor, and an embankment which slopes down to grade east of the station. The new LRT alignment would re-use the most of the existing retained fill structure west of the existing Bayview Station before diverging to the north to span over the O-Train corridor on a new overpass structure. This structure would accommodate the new three-level

Bayview Station before sloping back down to grade in the vicinity of Preston Street. Shifting the location of the new Bayview Station to the north will allow the existing Transitway to remain in operation for a much longer period of time during construction. The elevated station will be a reinforced concrete structure, designed to minimize cost and materials. The station will look similar to the SkyTrain stations in Vancouver and the Scarborough RT stations in Toronto.

At Hurdman Station, the elevated LRT segment and station is proposed to facilitate passenger transfers between buses and LRT, address issues with respect to constructability on the former landfill site, and allow for provision of access to NCC development lands to the north of the station. The segment would consist of an elevated fill embankment. The fill required to form the embankment would be "pre-loaded" onto the site to allow for settlement before construction of the LRT station and tracks. As the new alignment is located to the north of the existing Transitway Station, construction activities in this location will allow the existing Transitway Station to remain in operation throughout the construction period. This station will look very similar to Billings Bridge station.

## Construction Methods



## Construction of Underground Segments and Stations

Underground construction will be carried out by several different methods, including cut and cover, tunnelling (TBM) and mining techniques.

### *Cut and Cover*

Cut and cover construction will generally be limited to the areas around the west and east tunnel portals. There will be some visible cut and cover construction work at each station to construct the entrances and vent shafts (some locations which are not under the travel lanes, or which can be closed off may be constructed using open excavations, where local conditions permit). Campus Station will be constructed using the traditional open excavation method. The existing pedestrian connection between the Corktown Footbridge and the University of Ottawa would be maintained throughout the construction period.

In this construction technique a steel frame and timber decking is placed over the excavation, once it is deep enough) to allow traffic to return to the street while work continues underneath. The first and last stages of this work require extensive closures in the area of the work and there will be some lane restriction in place when the construction is active under the deck to remove excavated material and bring in construction materials.

### *Tunnel Boring Machine (TBM)*

Most of the downtown transit tunnel will be built by a use of a TBM. This is to avoid the surface disruption which cut and cover construction would entail and allow the tunnel to pass underneath existing buildings and the Rideau Canal zone.

A TBM is a purpose-built machine used to excavate a tunnel, handle excavated material (spoil) and install the segmented tunnel liner. The operation of the machine is a highly specialized undertaking and much of the actual construction is done automatically. The front end of the TBM is comprised of a circular cutting face that bites into the ground and pulls the excavated spoil into the machine. As ground in front is excavated, the machine uses pistons to push forward, before a concrete tunnel segment is installed behind the cutting face. The machine then uses the previously laid segment to push forward. The operation of the machine is more or less continuous once launched. The downtown transit tunnel will consist of two separate tunnel bores, requiring either two passes by a single TBM or single passes by two different TBMs. The number of TBMs to be used will be determined by the contractor responsible for building the tunnel.

The cutting face used on the TBM is configured to maximize productivity based on the subsurface conditions expected to be encountered. The configuration of the TBM used to bore the tunnels will be determined during at the preliminary design stage, once detailed geotechnical data has been analysed. Based on preliminary analysis of rock conditions, it is possible that a full face rotary TBM may experience difficulties due to the characteristics (blockiness) of the rock underlying downtown Ottawa. Use of a digger shield on the front of the TBM will provide mitigation.

### *TBM Launch Site*

The TBM will be launched from the west end of the downtown, in the vicinity of Commissioners Street. The site will house a variety of activities including storing tunnel liners, handling the tunnel spoil as it is removed, staging dump trucks to remove the spoil, offices and parking for the TBM and office crews, and other material storage and handling. An electrical power substation to power the TBM will also be needed.

A TBM launch chamber of about 40 m in length would be constructed to launch the TBM for construction of the bored tunnels. This can be constructed independently of the cut and cover tunnel carrying the LRT alignment under Wellington Street to the west, allowing early start of tunnelling work. The eastern extent of the launch chamber will be located such that the TBM can be launched directly into competent bedrock.

### *TBM Recovery Site*

After completion of a tunnel bore, the TBM will need to be taken out of the ground and either returned to the TBM launch site to start the second tunnel, or disassembled and removed. The TBM recovery site will likely be in the vicinity of either the Campus Station box or the eastern tunnel portal, south of Mann Avenue. A receiving chamber will be constructed to recover the TBM and allow it to be disassembled before removal by truck. This area will be quite busy during the 3-4 month removal period for each tunnel drive.

### *Mining*

Downtown stations will be mined out from within the tunnels, and all of the excavated material will be hauled out to the LeBreton work site staging area. A sequential excavation approach will be required to support the rock, buildings and roads above the stations. Specialized equipment or controlled drill and blast techniques will be used to create the mined caverns. Temporary supports, rock bolts and other measures will be needed to build the station. Waterproofing, drainage and the installation of a permanent concrete lining will be needed before work can begin to fit out the station for public use.

The proposed station caverns in the urban environment at relatively shallow depth will be significant undertakings in terms of both construction logistics and also of design and construction methods. There are relatively few comparable examples world-wide of major caverns below city centres, although examples do exist in Hong Kong, New York and South Africa. Extensive further design studies will be required to investigate and prepare detailed designs for the downtown stations. Based on the results of the detailed geotechnical investigation, it is possible that alternative designs for the station caverns may need to be considered to reduce construction risk.

## Project Staging

The exact sequencing of construction will be determined during detailed design of the project. It is likely that work on the tunnel component will commence first as this is the most lengthy and complex portion of the project. Most of this work can be done without disruption to existing bus operations, although construction of the East Portal (south of Mann Avenue) will likely require closure of the Transitway north of Lees Station. Substantial work at some station locations (Bayview, Hurdman, Blair) can also be accomplished without disruption to bus operations. As construction proceeds, sections of the Transitway will need to be closed to buses in order to allow conversion to LRT. Conversion will be done in logical segments to maintain bus service on the Transitway as long as possible, however once a section is closed for conversion it will no longer be accessible to buses. After construction of the entire line is complete, there will be a 6-8 month period for station fit-out, testing and commissioning before revenue service starts. During this time, all buses currently using the Transitway will need to find alternate routes.

## Duration of Construction Activities

While the final construction staging plan for the DOTT project will be the responsibility of the implementation team and the contractor selected to construct the system, the DOTT functional design process did look a the general objectives of the staging and opportunities to provide logical break points between sections and phases of work. Estimated durations were also compiled to allow for schematic planning of the implementation process. At the most general level, the project will be staged to:

- Minimize construction cost
- Minimize traffic and bus service disruption
- Optimize cash flow
- Maximize contractor efficiency

The staging will also follow these general principles:

- The tunnel and underground stations will likely start first, as these elements will take the longest to construct
- The Maintenance and Storage Facility must be completed midway through the construction of the project to allow for delivery of vehicles and vehicle testing
- Major work at Bayview, Hurdman and Blair is off the existing Transitway and can be done with minimal disruption to bus service
- Conversion of the Transitway will be done in logical segments to maintain bus service on the Transitway for as long as possible
- Once construction starts in an area, bus service will be rerouted, and will not return
- After construction is complete there will be a 6-8 month period for station fit-out, testing and commissioning before revenue service starts

## Transit Operations During Construction

Transit operations during and after Construction were a major consideration in the development of the functional plan, although the actual operating plans will need further review during the detailed design phase.

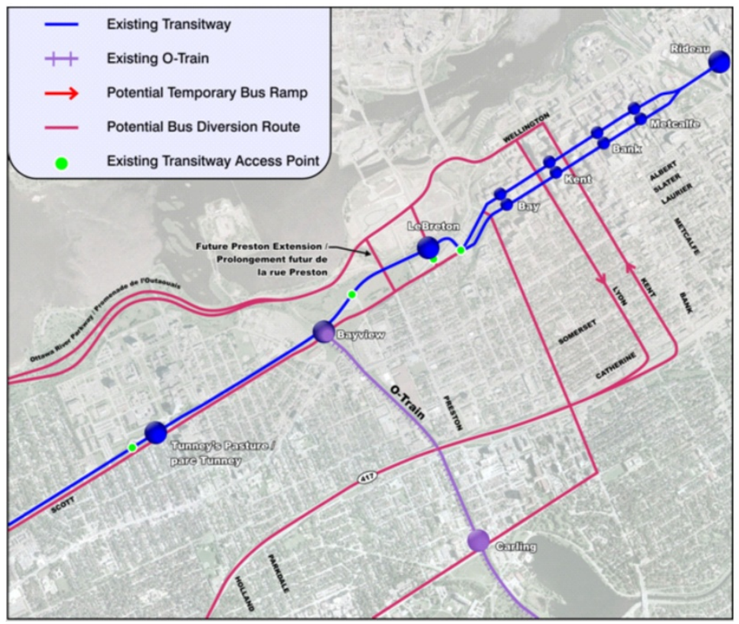
The bus network that is put in place after construction will need to reflect the ridership patterns in place at that time. However, there are several assumptions that were made to determine the impact of construction on bus services and to size the bus transfer facilities included in the functional plan.

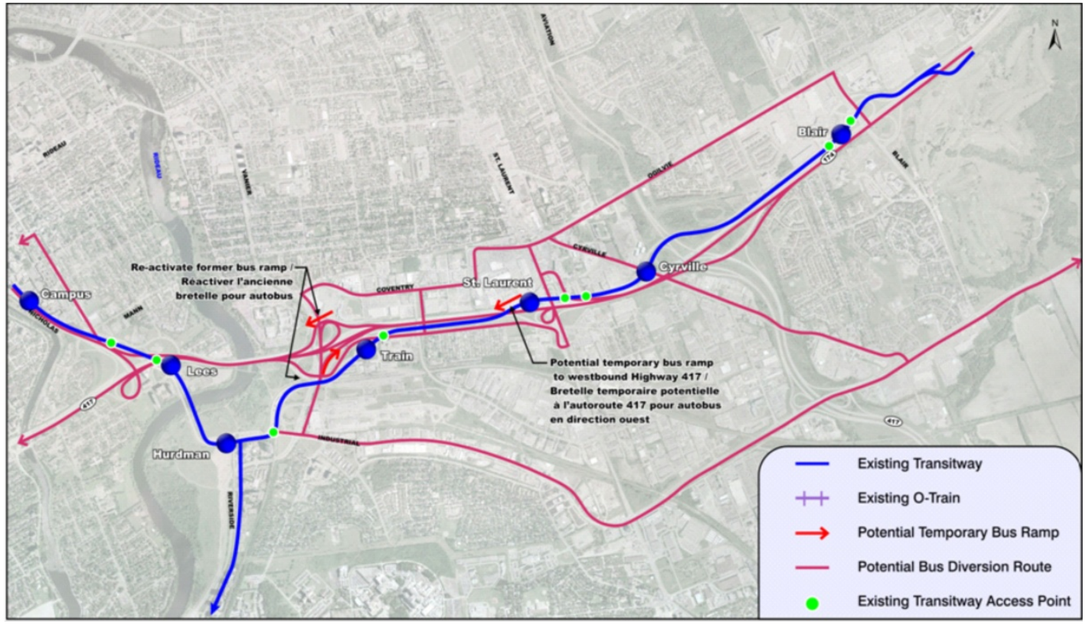
## Bus Operations During Construction

The DOTT project assumed that various segments of the Transitway will be out of service as construction proceeds, during which alternative arrangements will be needed, including:

- Use of the shoulder or outside lane of the Queensway
- Dedication of traffic lanes to transit usage along some streets
- Implementation of traffic signal priority along key routes
- Minor reconfiguration of intersections and interchanges to give buses priority
- Several alternate routes will be required, likely including;
    - Innes, Industrial, Ogilvie, Coventry, Tremblay, Riverside and the Queensway in the east, and
    - The Queensway, Carling, Scott/Albert and the Ottawa River Parkway in the west
- Bus routes may be segregated into local and express services and assigned to different routes to minimize local impacts

During the detailed design phase the final detour plans will be closely co-ordinated with construction staging. These plans may include temporary station facilities to provide good connectivity to local routes and major trip origins and destinations, for instance if buses serving St. Laurent Station are by-passing the existing station, expanded bus bays may be required on St. Laurent to facilitate transfers.



## O-Train Operations During Construction

The operation of the O-Train will be unaffected by the construction of DOTT, for the most part. The relocation of existing Bayview O-Train platform can be undertaken with only minor disruption to service (to connect track, text and commission new platform). Construction of the new overhead station and the removal of existing Transitway overpass may require temporary closure of the station or temporary relocation of the platform further south away from the construction zone.

Given the constraints of the existing O-Train operation, an increase in service is not possible to provide a viable alternative for travel from the east/southeast into downtown while the Transitway is closed for conversion to LRT.

## Property Acquisition

Most of the LRT alignment and stations are located within the existing Transitway right-of-way, or under public road rights-of-way. At several locations, federal property is required for new alignments, stations, or temporary facilities. Private properties are also required to enable construction of station entrances and vent shafts and the Maintenance and Storage Facility. Below-grade easements will also be required to allow the City to construct the tunnel under lands owned by other public agencies and private owners.

# Operation

## Light Rail Operation

### *DOTT Operation*

A detailed operating plan for the DOTT will be developed prior to opening of the line for revenue service and adjusted as ridership patterns develop and establish themselves. Operating plans will address LRT operations under a variety of different scenarios (normal, emergency, special events).

Based on current ridership forecasts, it is expected that 3 or 4-car LRT trains will be required to operate on the line at the following headways:

- Early Morning – 10 minute service (opening day and 2031)
- Shoulder – morning peak – 5-minute service (opening day and 2031)
- Morning peak – 3-minute service opening day, 2-minute service in 2031
- Midday – 5-minute service (opening day and 2031)
- Afternoon peak – 3-minute service opening day, 2-minute service in 2031
- Early Evening – 5-minute service (opening day and 2031)
- Late Evening – 10-mimute service (opening day and 2031)

The provision of a pocket track at Hurdman Station will allow operational flexibility to provide more frequent service through the downtown transit tunnel to match demand on what will likely be the busiest segment of the line. Once future LRT extensions (e.g. N-S LRT) are in operation, refinements to LRT operation will need to be undertaken to accommodate interlining and/or overlapping of services.

### *O-Train Operation*

After completion of the DOTT project, operation of the O-Train will remain as at present, until such time as future N-S LRT is constructed in accordance with the City's TMP.

## Bus Operation

The introduction of the LRT will have a substantial impact on the entire bus network in the City. Routes will need to be truncated at the terminal stations of the LRT, reorganized to better serve the local communities around stations and reallocated to improve service outside the LRT corridor. The operation cannot be planned in detail at this time as the exact arrangement of routes and service frequencies are dependent on the level and types of services being operated when the system opens.

At the end of the construction period, there will be substantial changes to the existing BRT and local bus routes to provide connections with the new LRT line, reflect the new operating philosophy, respond to ridership growth and changes in ridership patterns and meet the operating budget requirements in place at the time.

## Terminal Stations

Tunney's Pasture and Blair Stations are the two terminal stations. Tunney's pasture is an interim terminal until the line is extended further west, whereas Blair Station is the eastern terminal for the foreseeable future. Terminal stations act as a focal point for bus routes beyond the end of the rail line and also act as major transfer points. The number of routes and the handling of passengers at these two stations are critical as they form the largest transfer points in the system.

During the functional planning the size and layout of the bus areas, including driveways, passing and turning lanes, platform space (for buses and passengers) as well as circulation elements between the bus platforms and LRT platforms was carefully reviewed. The stations have been adequately sized to handle the volume of passenger traffic predicted for the 2031 planning year.

Flexibility in operation is a key feature of terminal stations and the number and diversity of routes can increase over time. The number of bus bays and the allocation of space for buses and passengers will allow for good operation.

## Major Transfer Stations

Bayview, LeBreton, Hurdman and St. Laurent are major transfer stations. These mid-line stations connect to existing LRT or BRT facilities or major groupings of local bus routes and must be planned to accommodate the predicted number of bus transfers. Volumes, while large, are substantially less than at terminal stations.

The functional planning reviewed the number of passengers predicted to use these stations, and the likely number of bus routes and buses per hour that will need to operate to support the service. These stations have been adequately sized for the predicted 2031 passenger volumes.

## Connecting Routes

The majority of the remaining stations have some form of bus connection. None of these stations serve a volume of traffic to warrant separate off-street facilities, with the possible exception of the Downtown East Station and its connection to the local downtown routes using Bank Street. At this location there is no potential location for an off-street facility and transfers will take place using the bus local stops on Bank Street.

A number of these routes will be reorganized once the line is operational. Service could be split at the connecting station to balance service to meet demand in a more effective way than is done today. For instance, some of the local downtown routes end or short-turn service near the Rideau Centre as that is the focus of downtown operations today. With the addition of a transfer to the LRT at Bank Street some routes may alter their service patterns here rather than at the Rideau Centre.

The modifications to connecting routes will be done as the line approaches opening day. Changes in travel patterns, passenger volumes and changes in demand caused by the LRT will all need to be considered as part of confirming these route changes. It is expected that this process will be part of OC Transpo's annual service planning process.

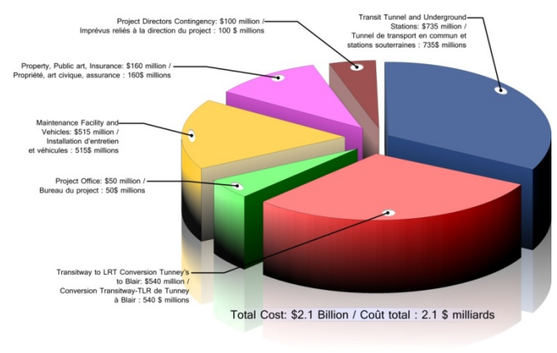
# Project Cost

## Cost Estimate

Detailed costing of the project has been carried out based on the recommended plan. Costing information includes an estimate for property acquisition, design, project management, construction, vehicles, and contingency. The capital cost estimate for this project is $2.1B, in 2009 dollars. The following is a summary of the major cost elements of the project:

- Transit Tunnel and Underground Stations: $735 million
- Transitway to LRT Conversion: $540 million
- Maintenance and Storage Facility and Vehicles: $515 million
- Property, Public Art, Insurance: $160 million
- Project Director's Contingency: $100 million
- Project Office: $50 million

This project cost estimate is subject to refinement as the project progresses through preliminary design. It does not include escalation.




## Cost Estimating Process

The process used to estimate the project costs is based on breaking the project down into small units or standard cross-sections and developing a cost for each item, then through a process of calculating the number of units and building up the total cost by multiplying the two. The unit take-offs, as they are called, are estimated from the functional design drawings. Costs are based on current construction projects in the City of Ottawa, industry estimates from similar projects and derived costs based on specific procedures or construction methods.

At the level of design completed to support this functional design report, the accuracy of the cost estimates can be considered Class D that is the estimate will be accurate to +/- 25%.

## Contingencies

Contingencies are added to the elements of the cost estimate to reflect the risk associated with the item. These risks can include fluctuations in price in the market, uncertainty related to how the item is delivered and installed or the risks associated with the method of construction. Some elements carry more than one risk, but in general the elements in the cost estimate have been divided into three categories; high risk, medium risk and low risk. Each of these risk levels has been assigned a percentage contingency that is carried in parallel with the extended unit costs and reported in the cost estimate. The use and assignment of contingencies to costs is industry standard practice.

The risks are wide and varied in a major project such as this. For instance, the cost of steel, which is a major component of constructing reinforced concrete structures, has fluctuated widely over the last few years as demand in China has increased and decreased. Average or trend costs have been used in the cost estimate, however the risk of fluctuation is large and additional contingency has been assigned. While steel may carry a high risk, the construction of concrete structures is commonplace in Ottawa and the process of design is well developed. Estimating quantities is well understood as is the procedure for developing design, allowing a lower risk to be assigned to these elements. However, while most concrete structures are well understood in Ottawa, creating tunnels and underground stations using concrete is not as well understood, thereby increasing risks. These factors, and other related factors are balanced to assign the degree of contingency on each item.

For the purposes of this project, high risks have been assigned a 25% contingency, medium risks a 15% contingency and low risk items a 10% contingency. Sensitivity analyses on the range of total project costs that could be expected with different contingency levels were tested and formed part of the decision to include a Director's Contingency.

### *Director's Contingency*

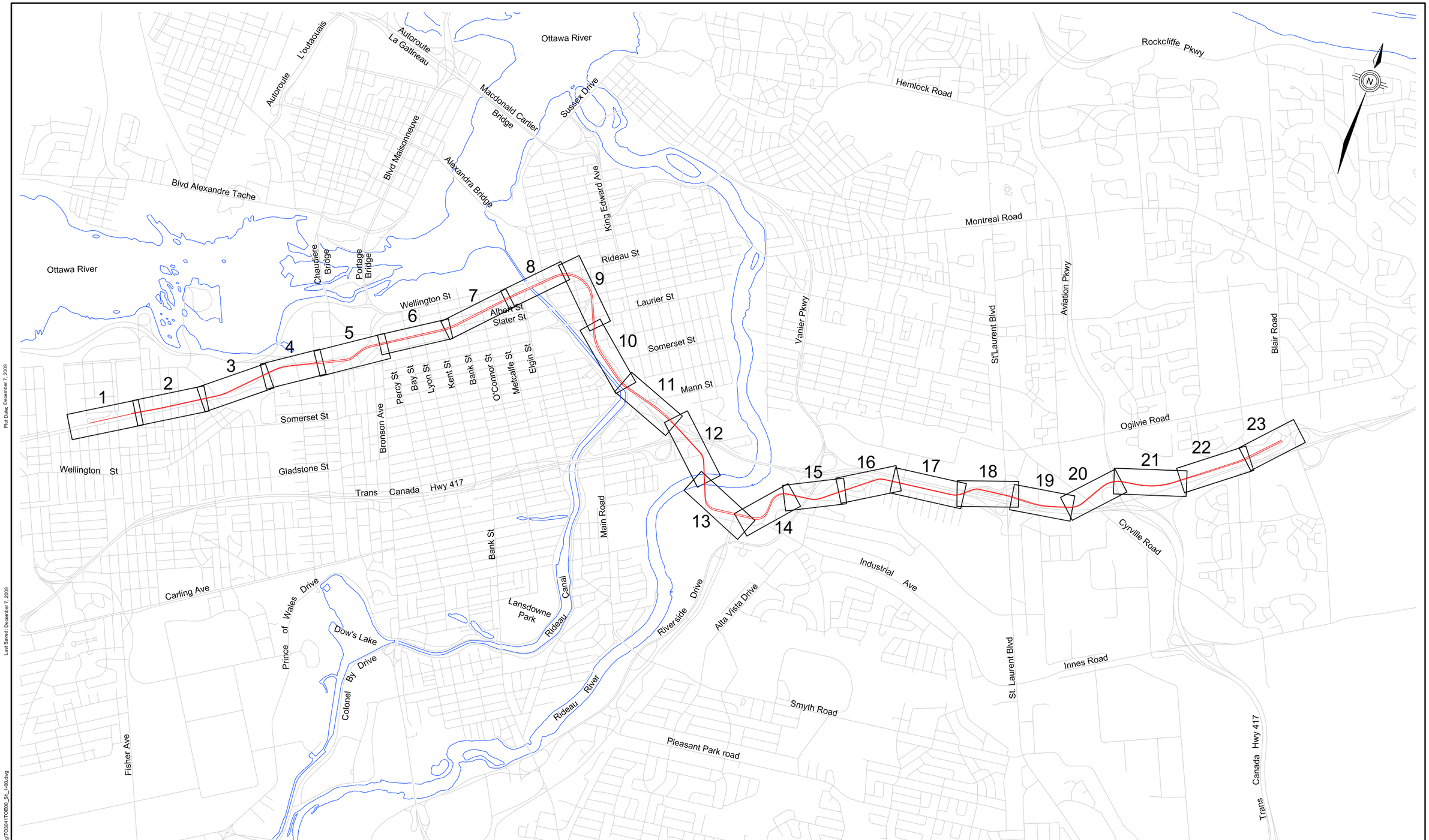
This form of contingency has been successfully used by the City of Ottawa on other large projects. Notably, the Transitway implementation budgets included a Director's Contingency that was used to cover additional unforeseen items or additional scope that was

added during detail design and construction. While care is taken at the functional planning stage to uncover and estimate the costs of each item, not all issues can be foreseen. For instance, the extent of landfill in the vicinity of Hurdman Station, and the method used to remediate it, are well understood, detailed investigations have not been undertaken to detail the exact depths of material, its composition of how much water may be present at the site. Additional scope to improve connectivity to stations, beyond the level contemplated in the functional planning may also draw on this contingency.

# ALIGNMENT PLANS

Recommended Plan

Downtown Ottawa Transit Tunnel: Tunney's Pasture to
Blair Station via a Downtown LRT Tunnel

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# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

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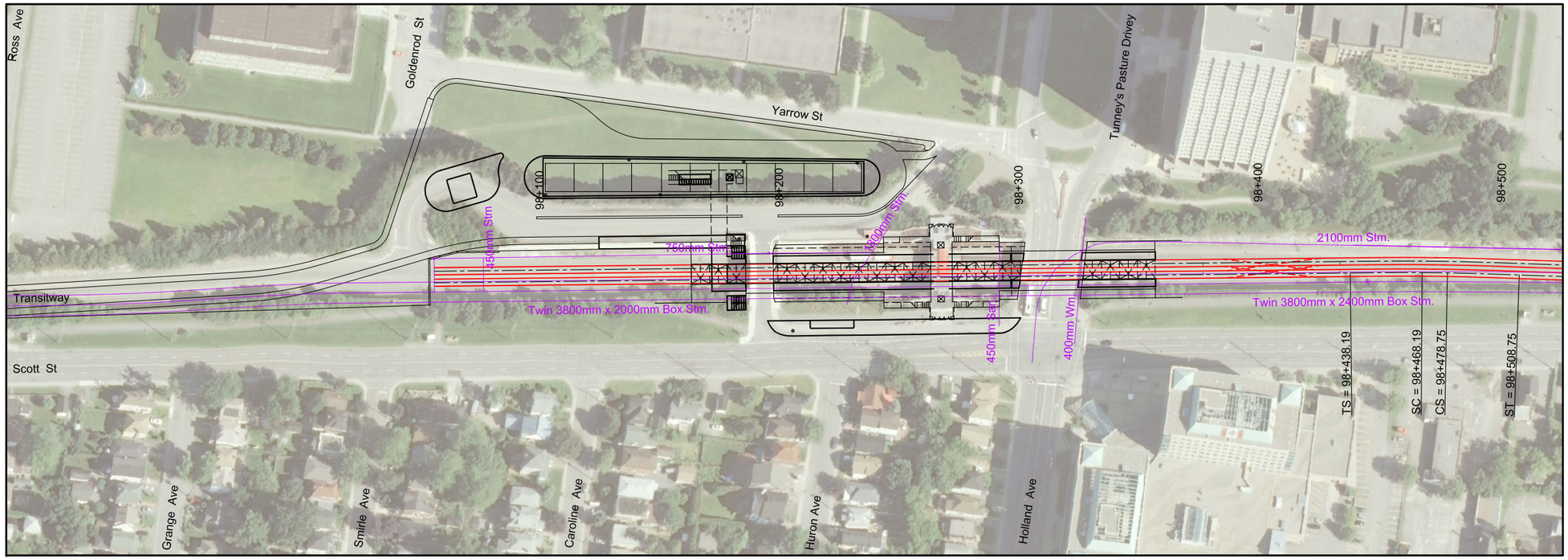


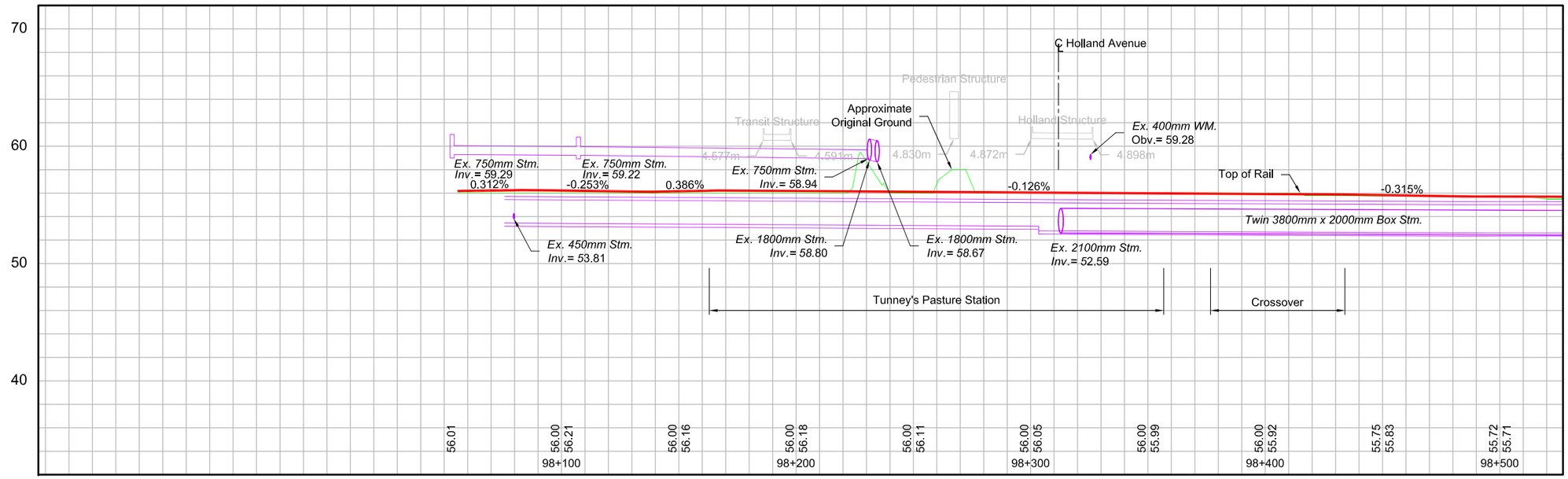


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# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

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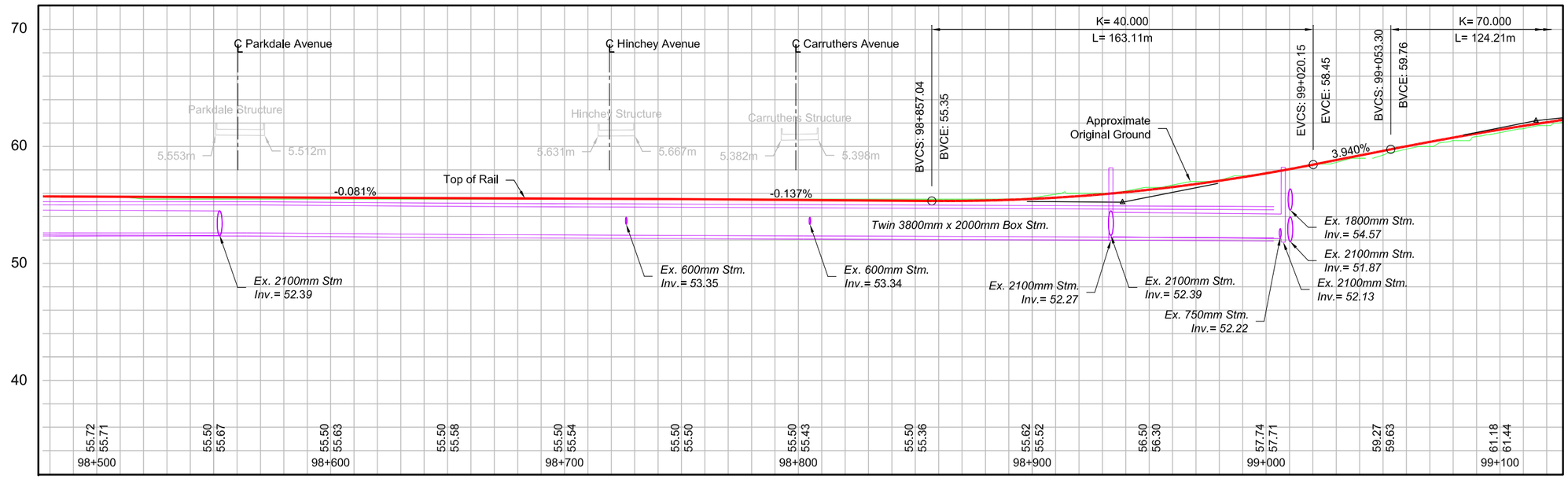


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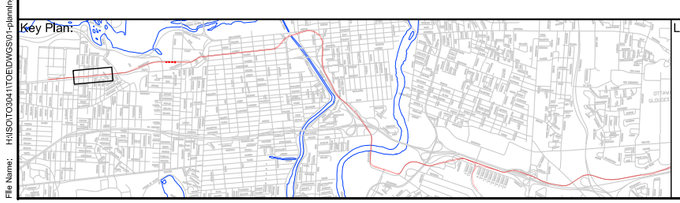

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# Downtown Ottawa Transit Tunnel

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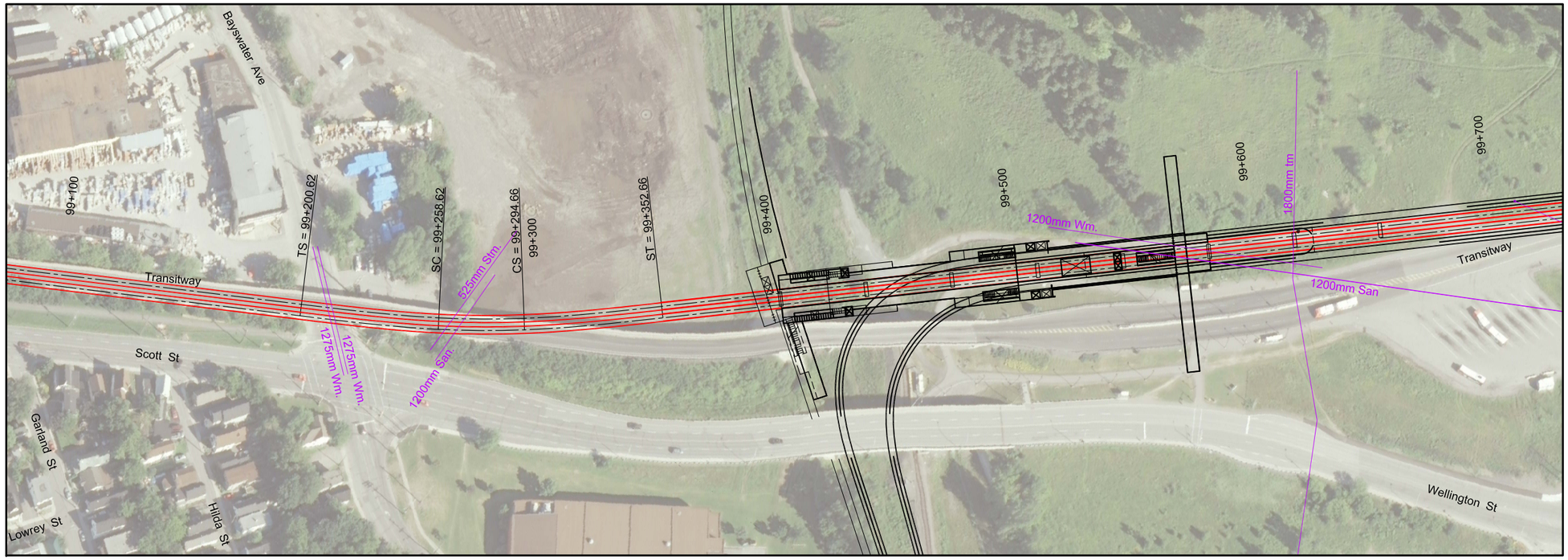


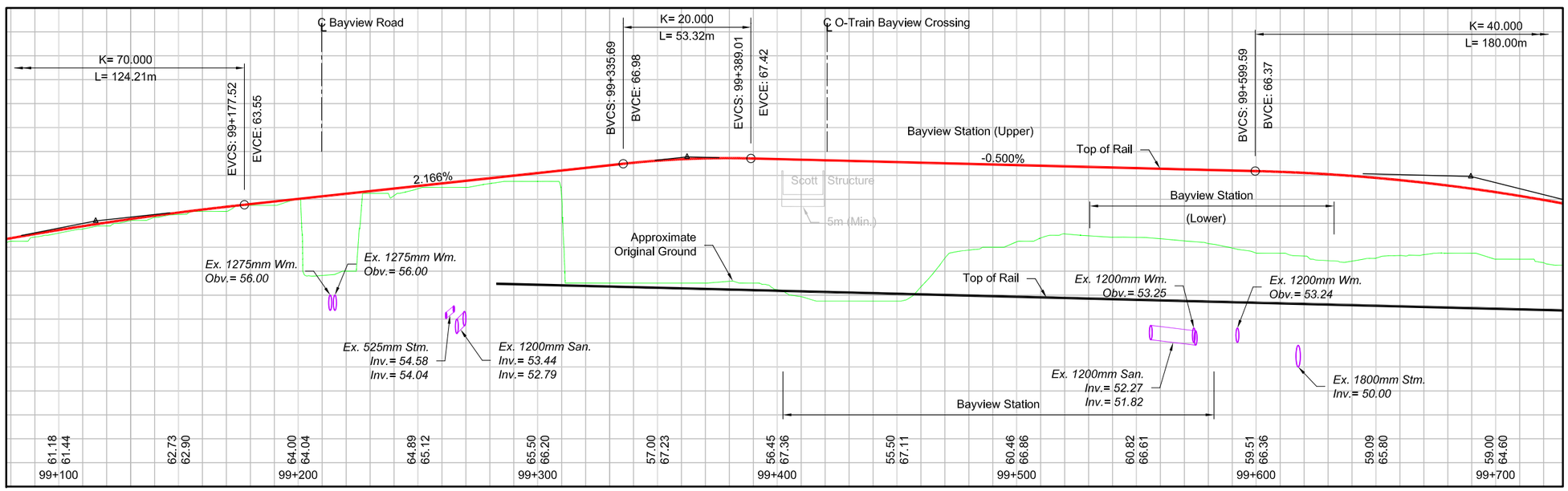


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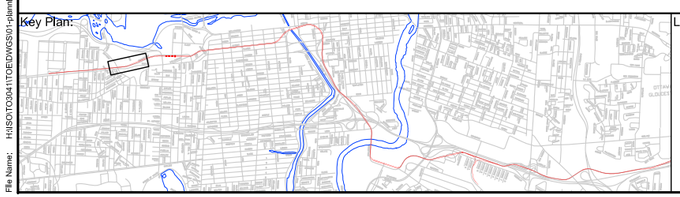

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# Downtown Ottawa Transit Tunnel

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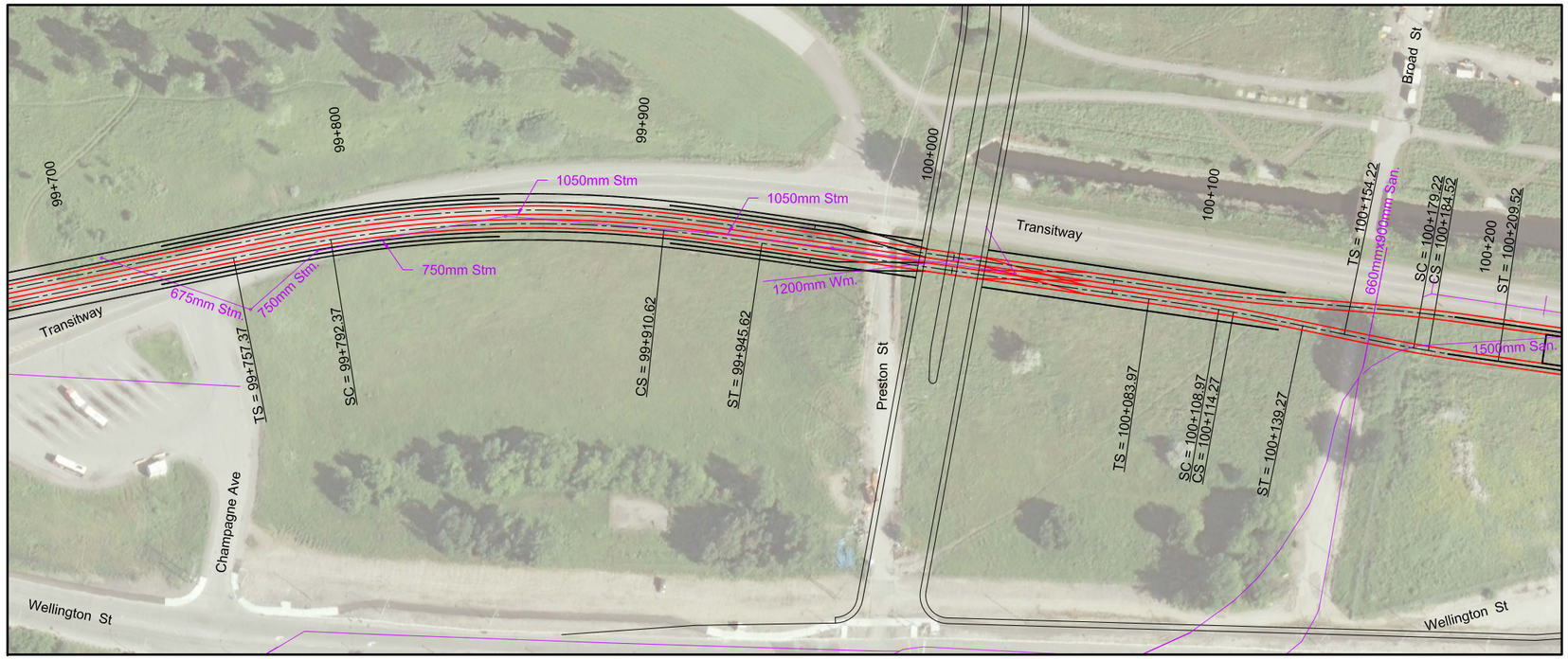


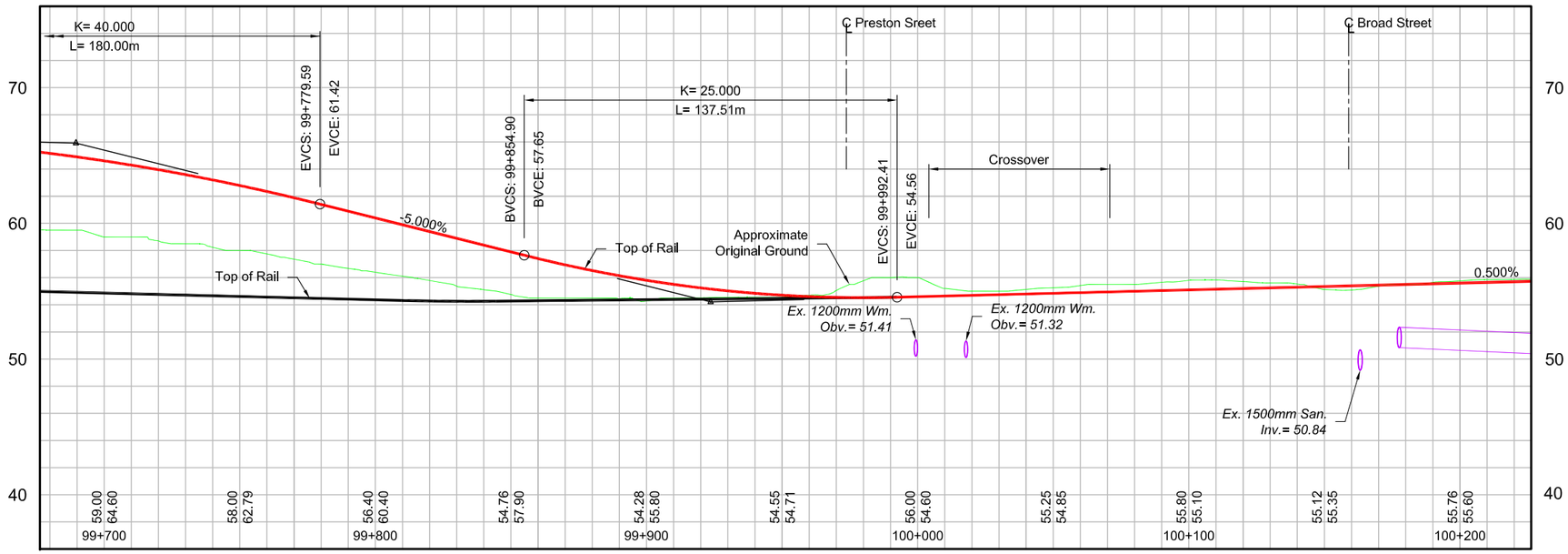


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# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

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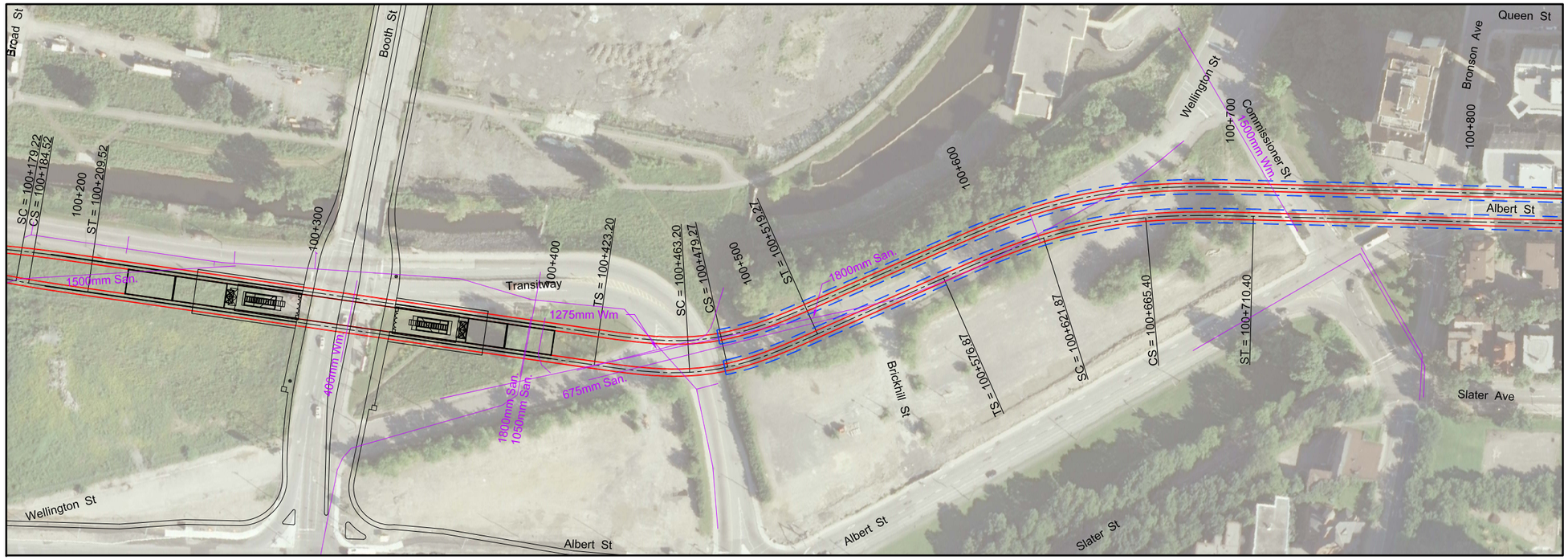


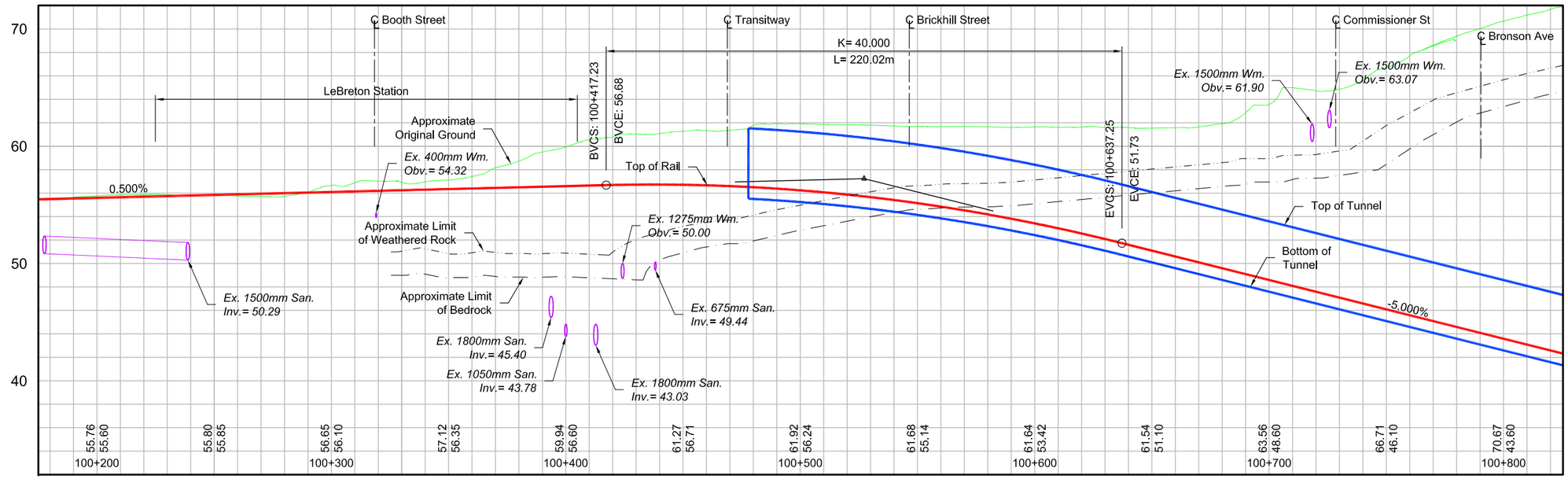


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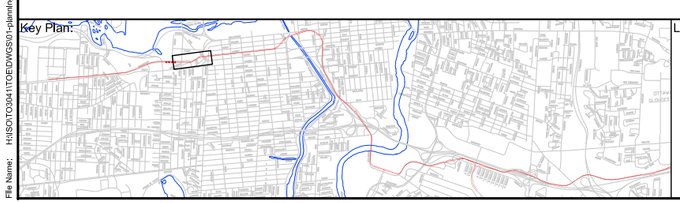

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Ottawa
Delcan
MRC McCORMICK RANKIN CORPORATION

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-5

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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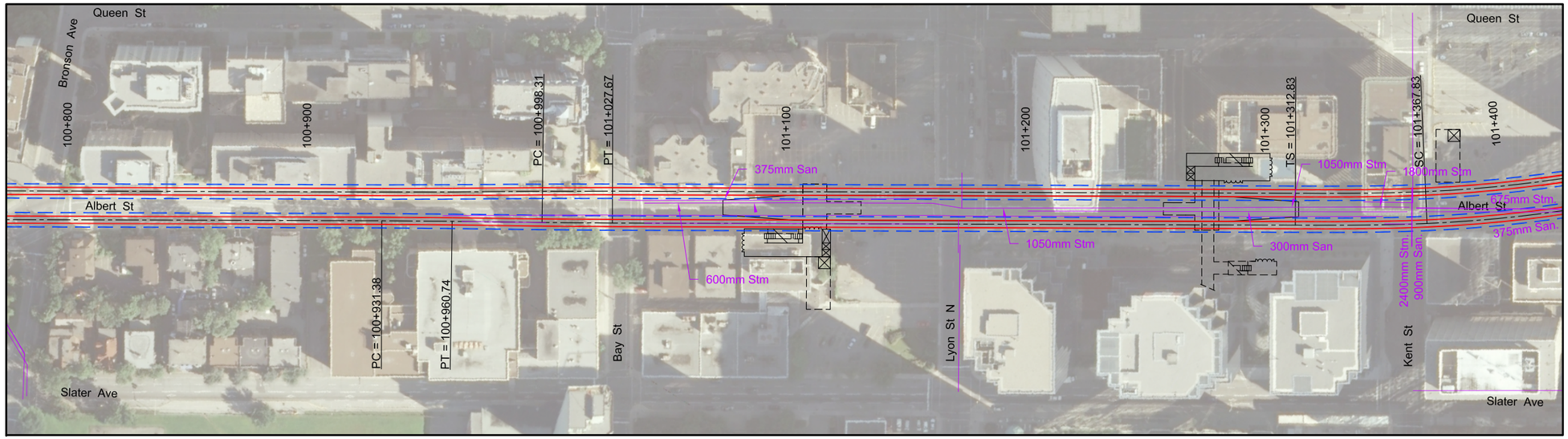


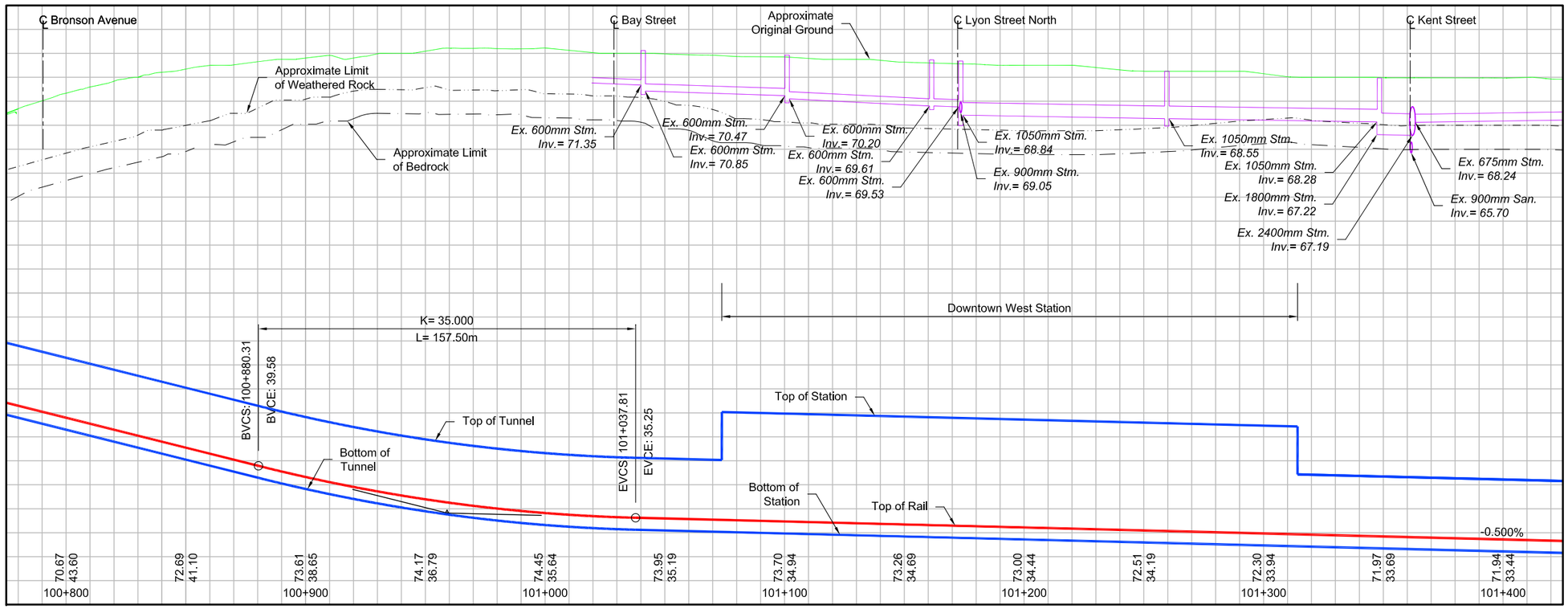


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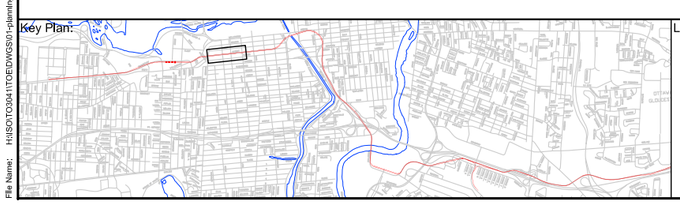

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-6

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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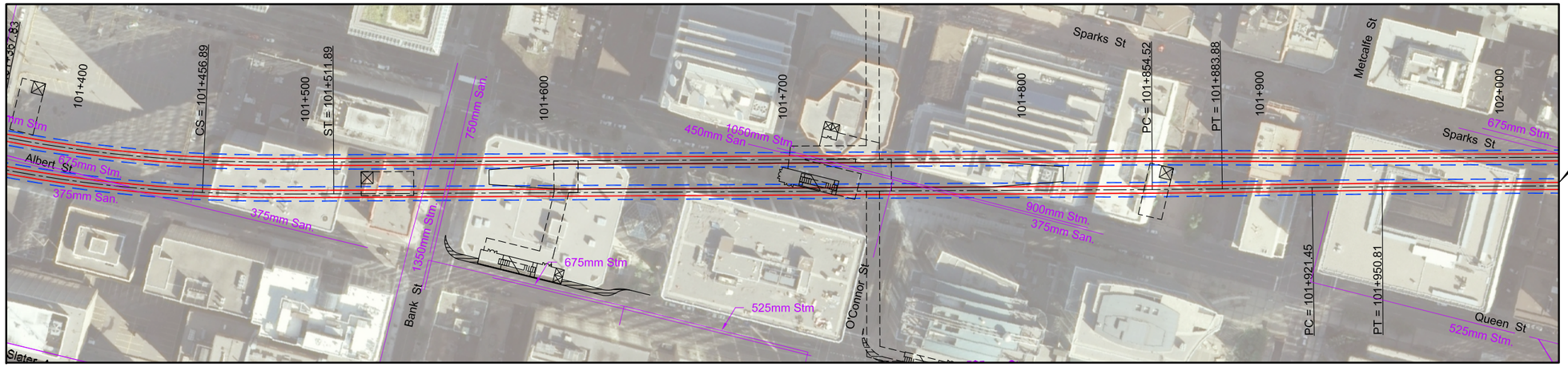


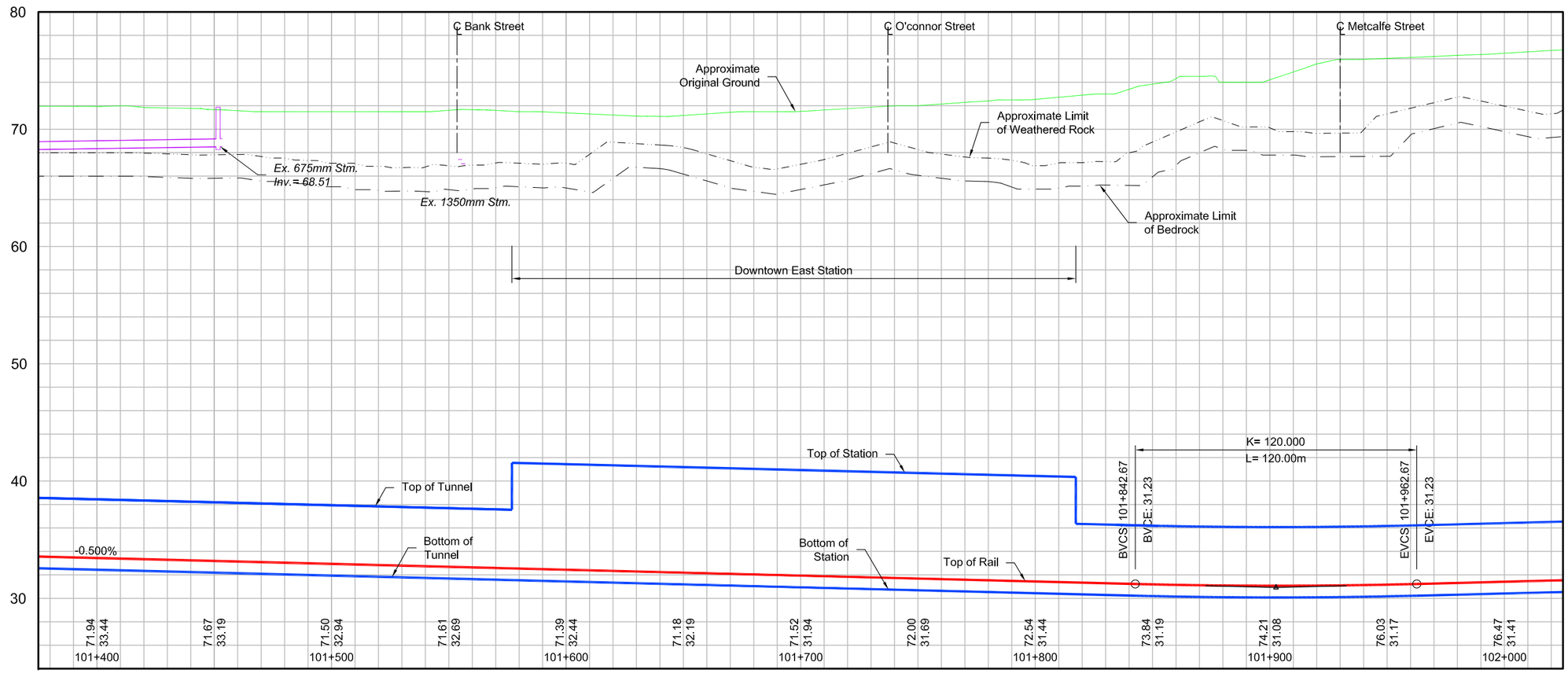


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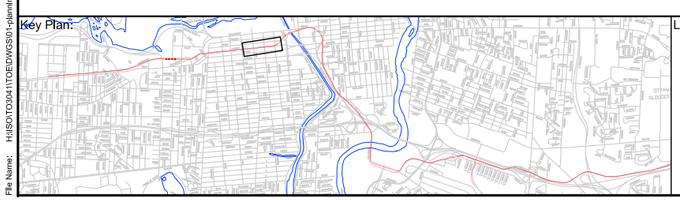

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-7

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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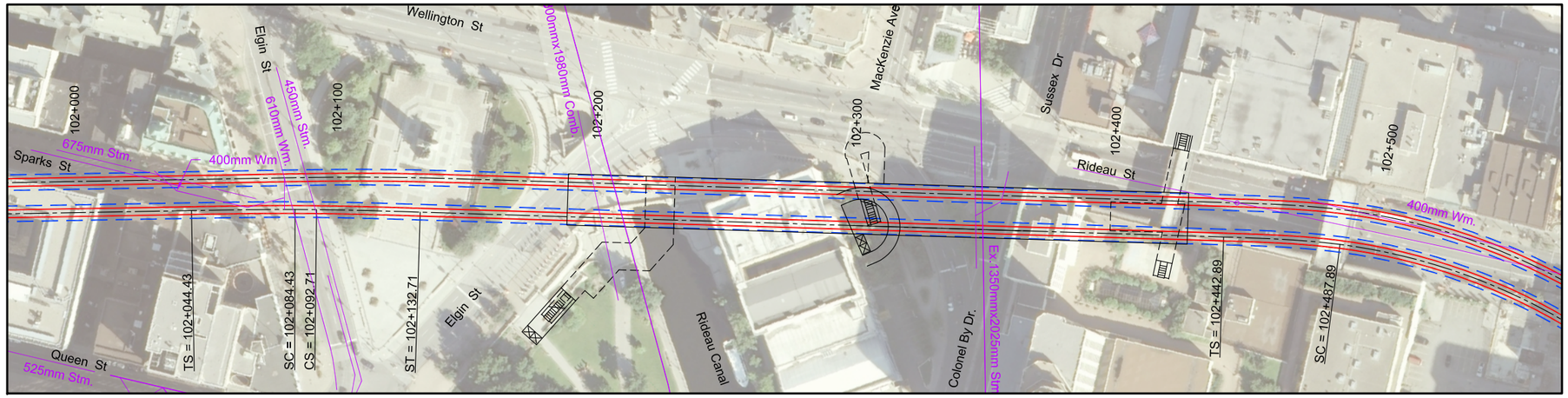


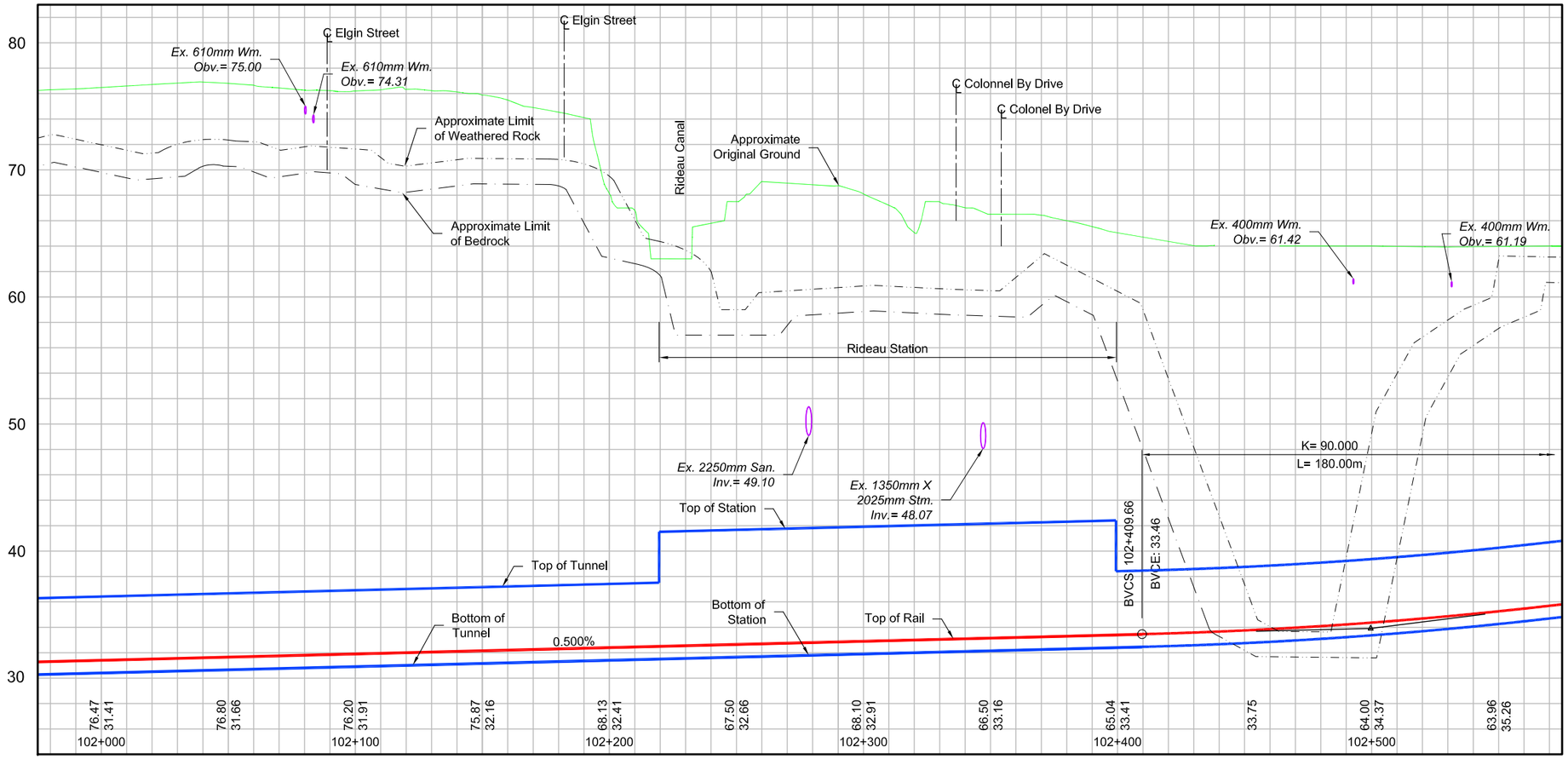


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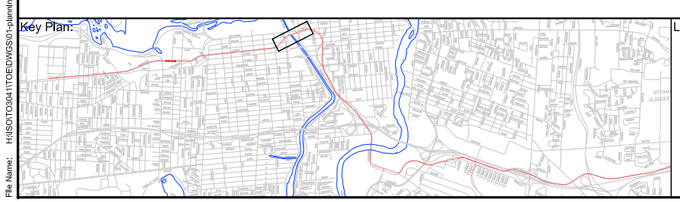

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-8

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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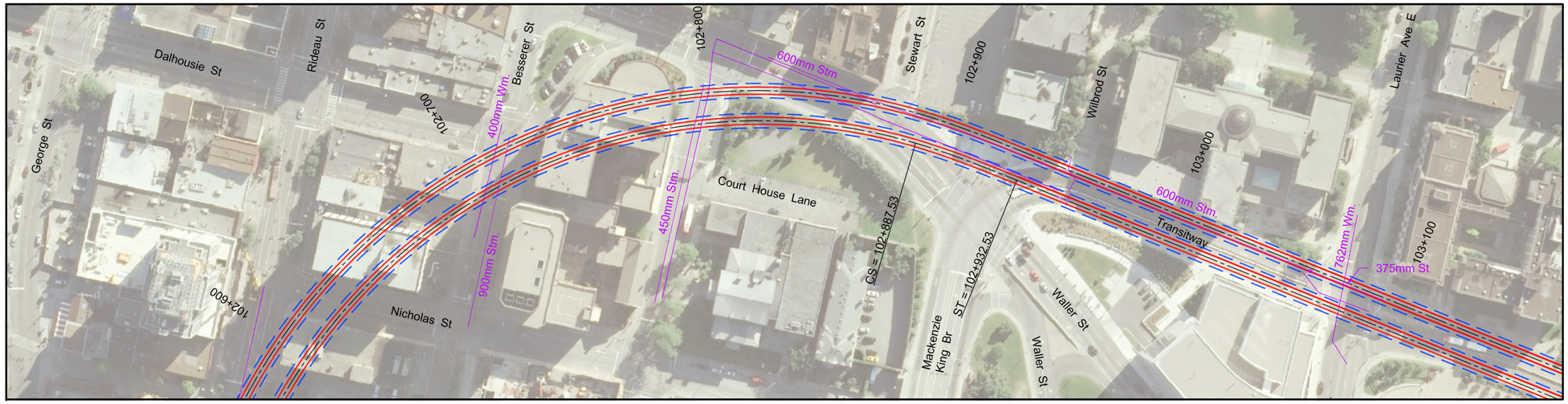


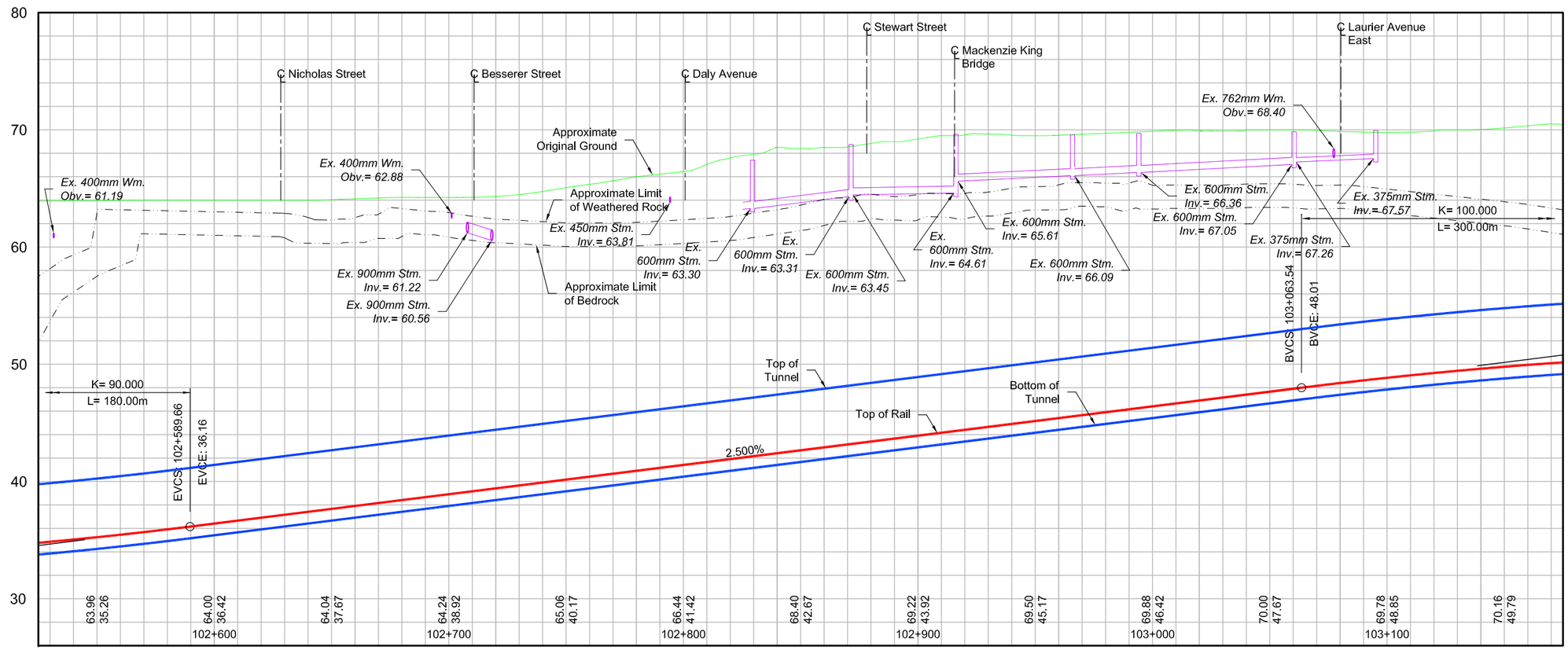


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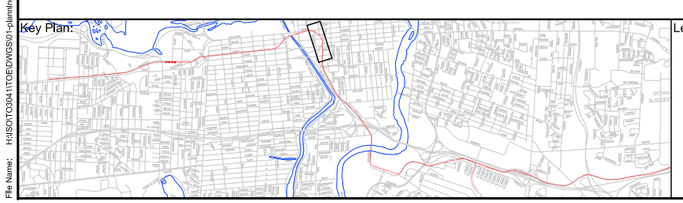

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-9

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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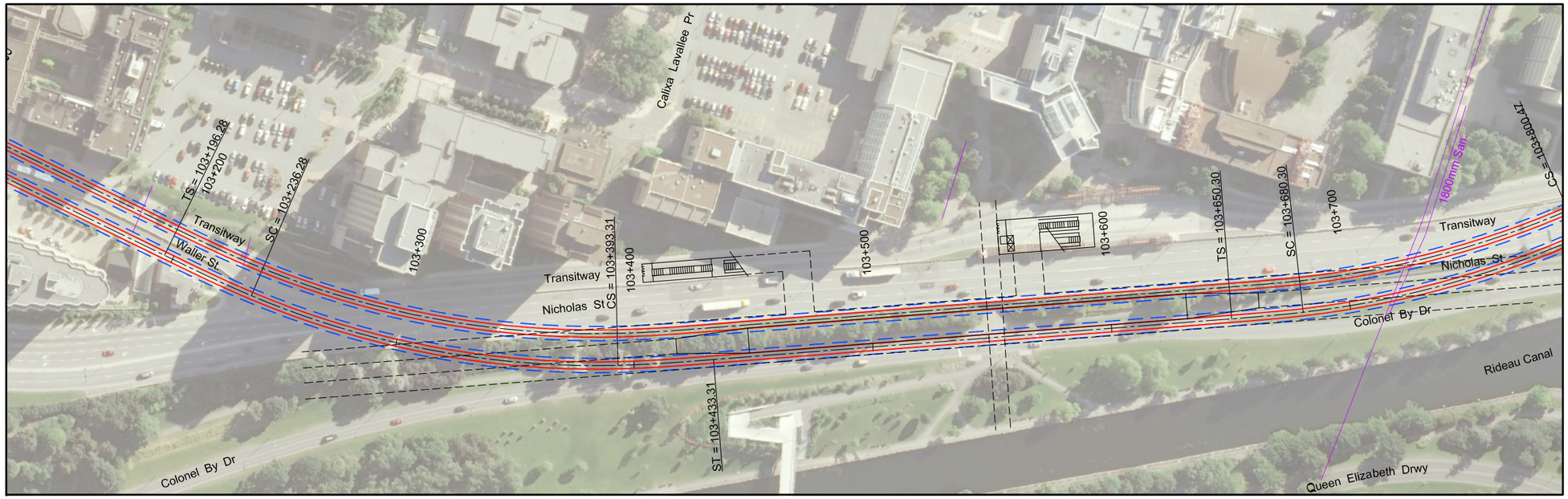


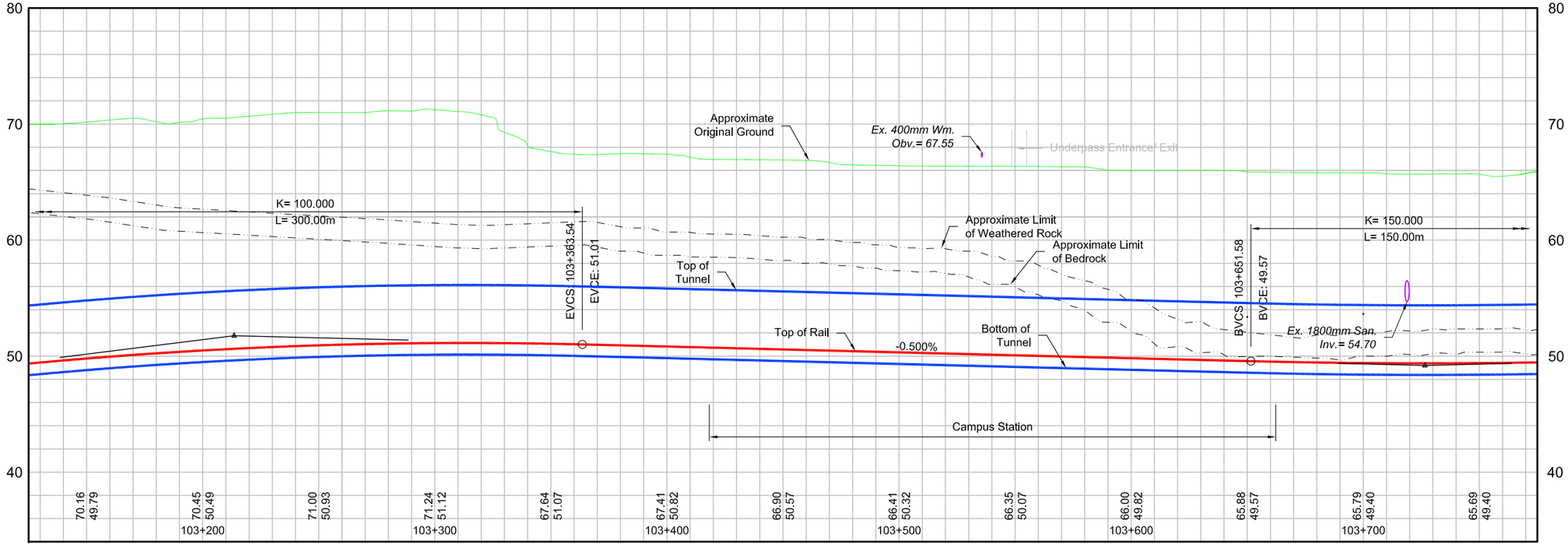


Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-10

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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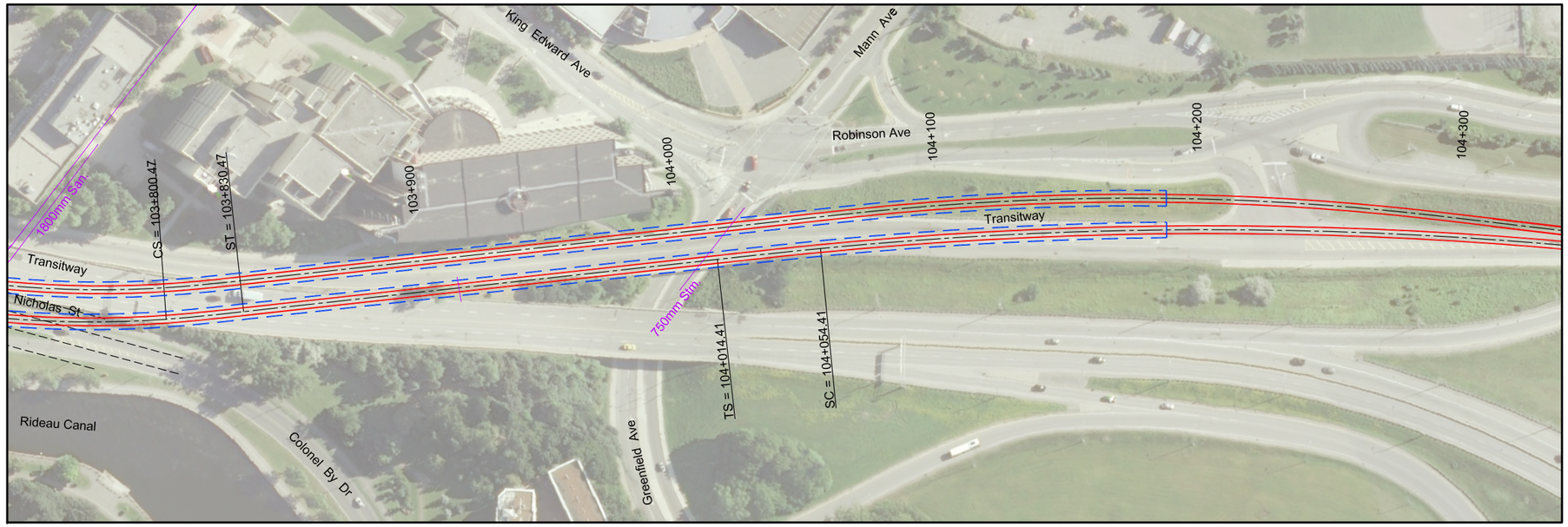


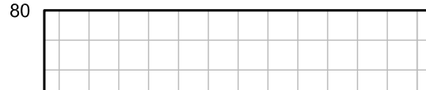


Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-11

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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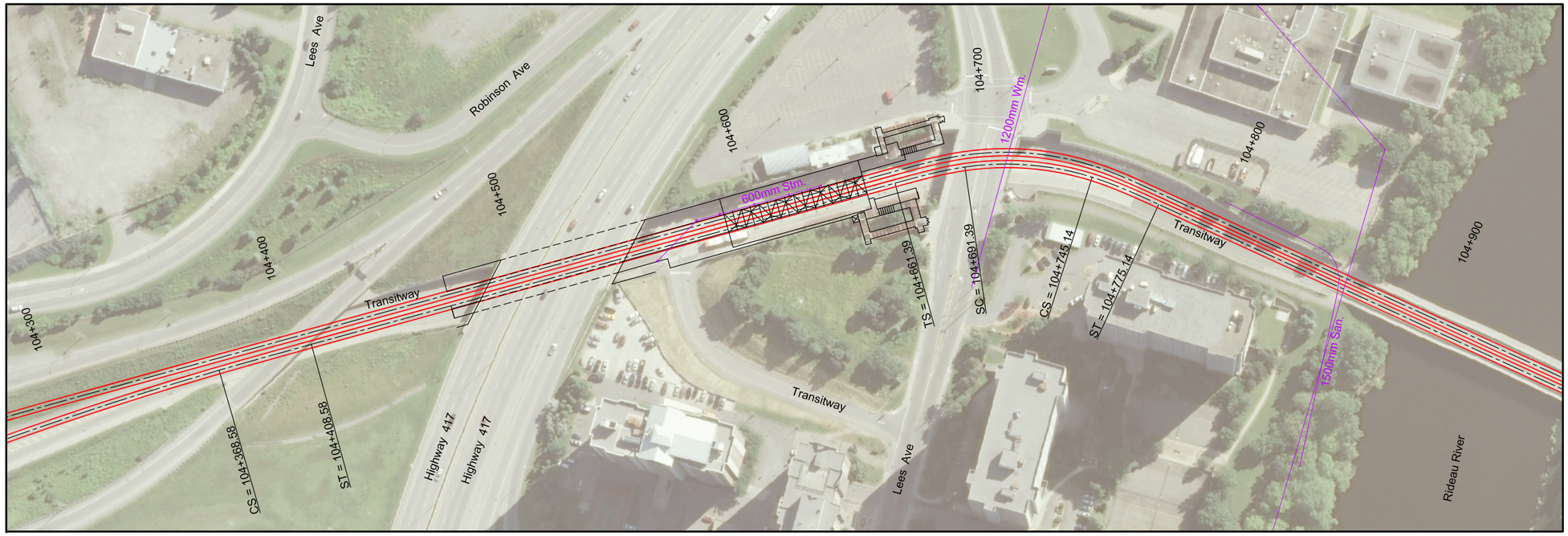
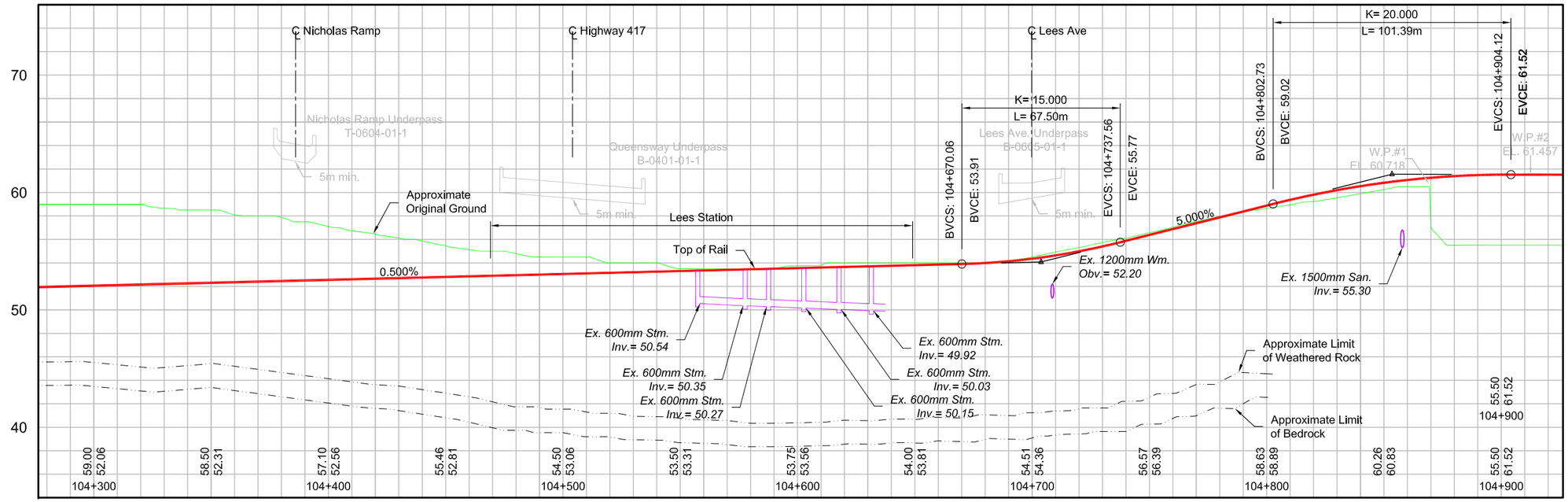
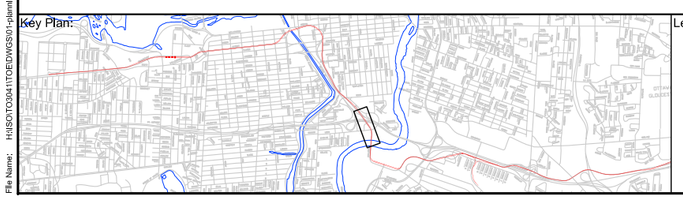



Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-12

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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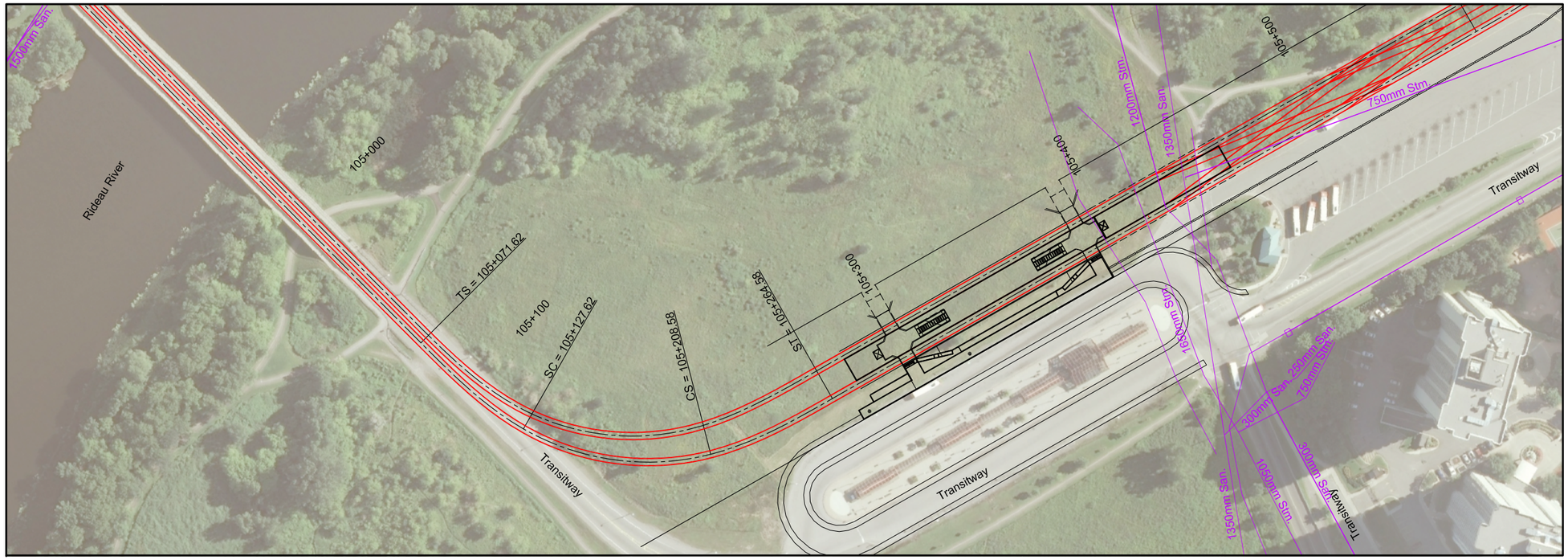
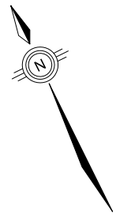
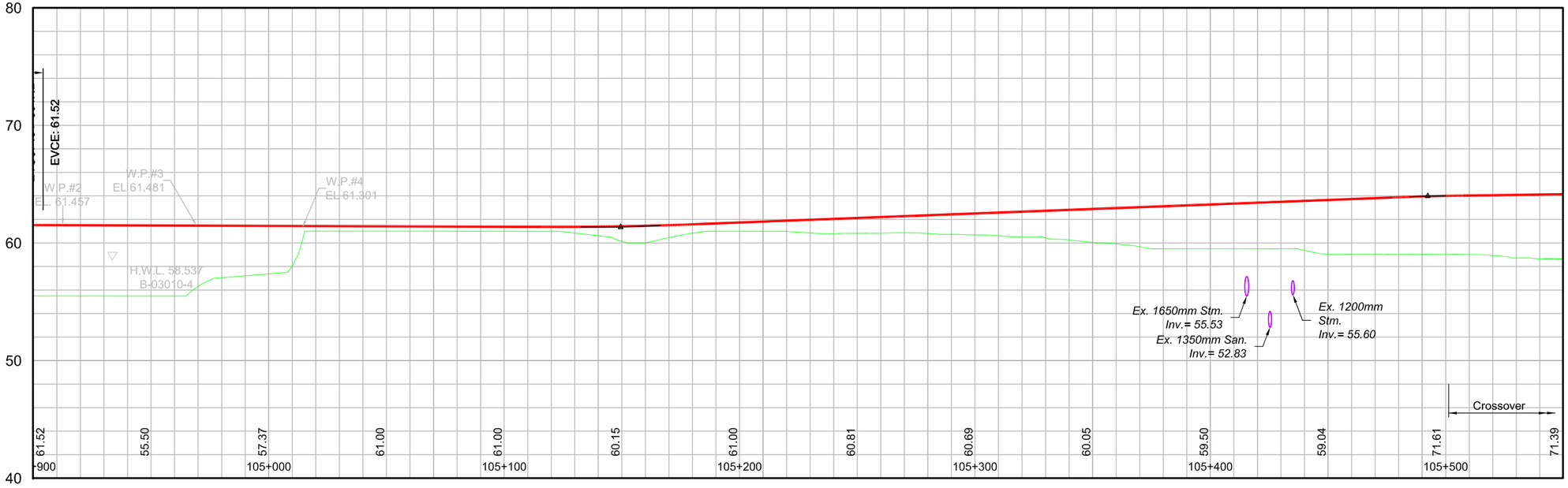
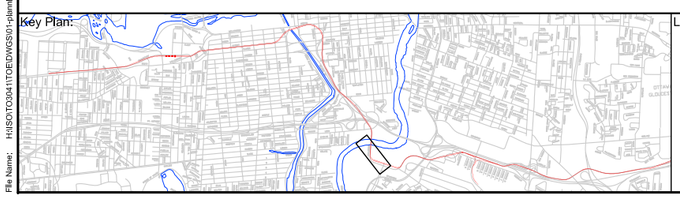



Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-13

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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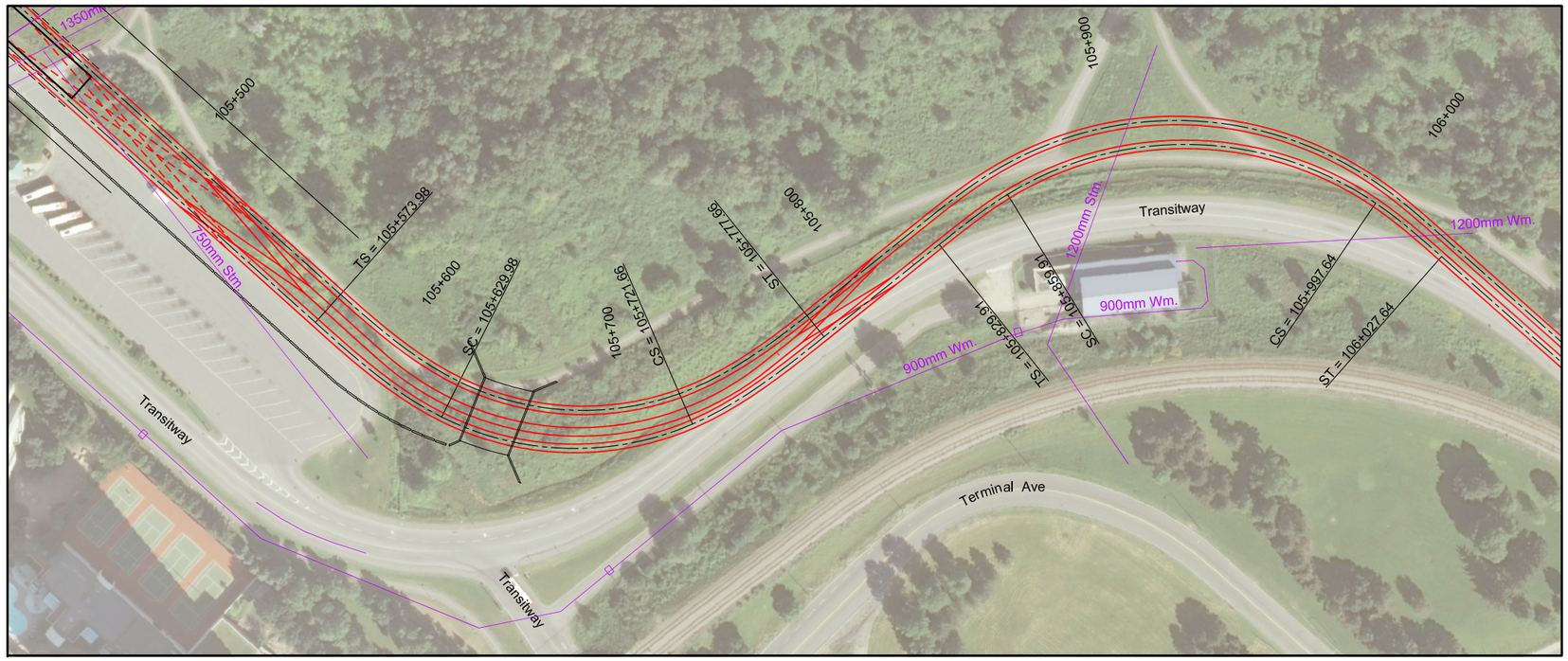


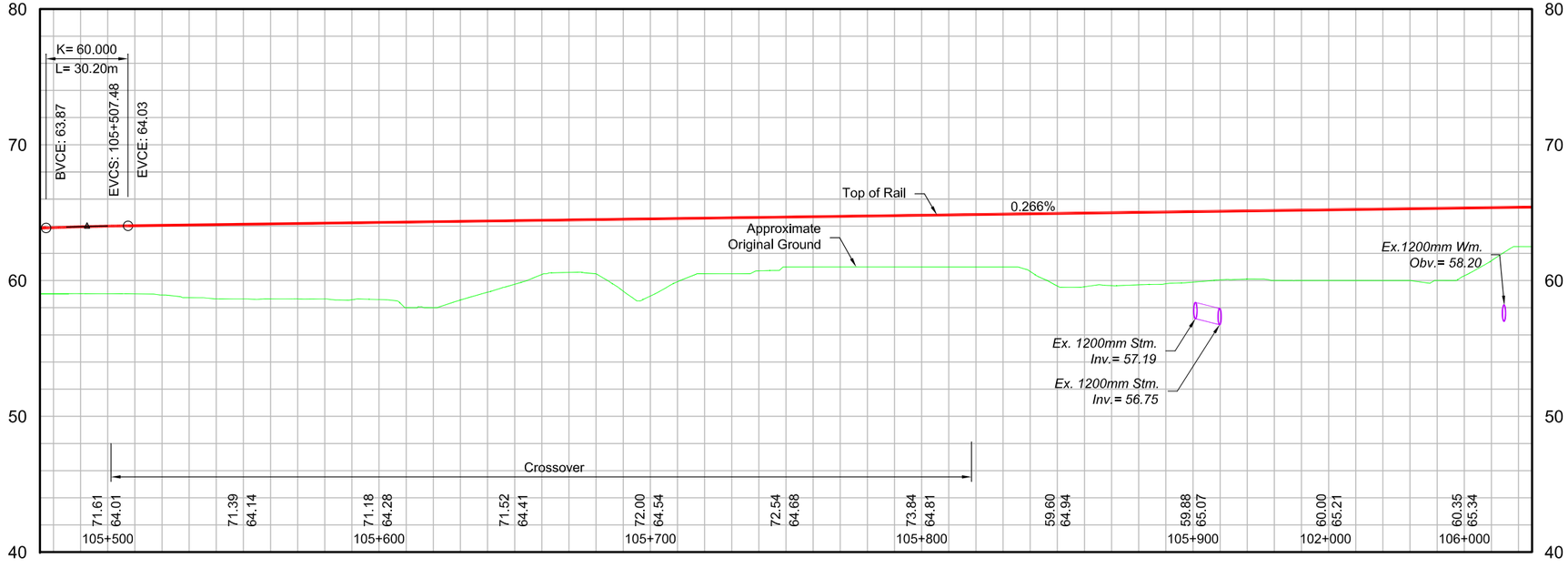


Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Ottawa
Delcan
MRC McCORMICK RANKIN CORPORATION

Section:

Section

Subtitle
Subtitle
Subtitle

Revision: .

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Plot Date: December 7, 2009

Last Saved: December 7, 2009

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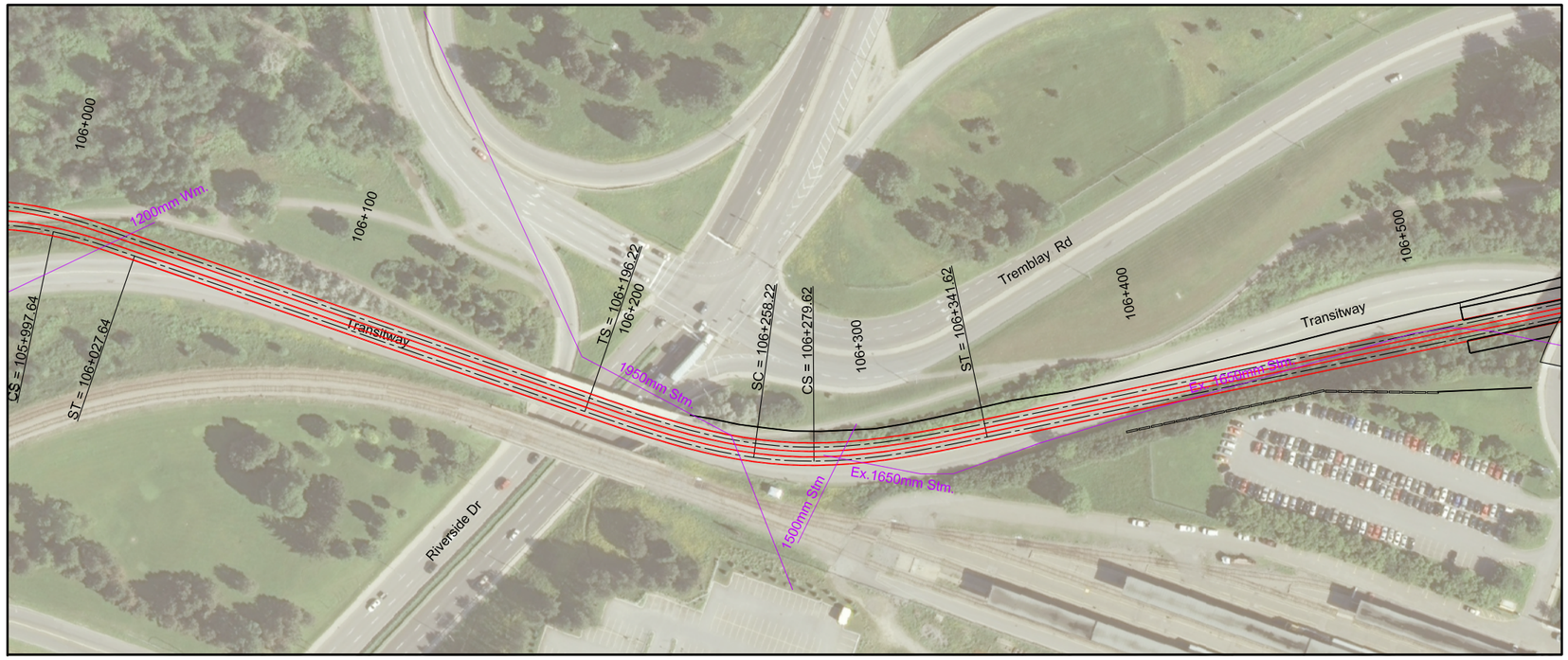


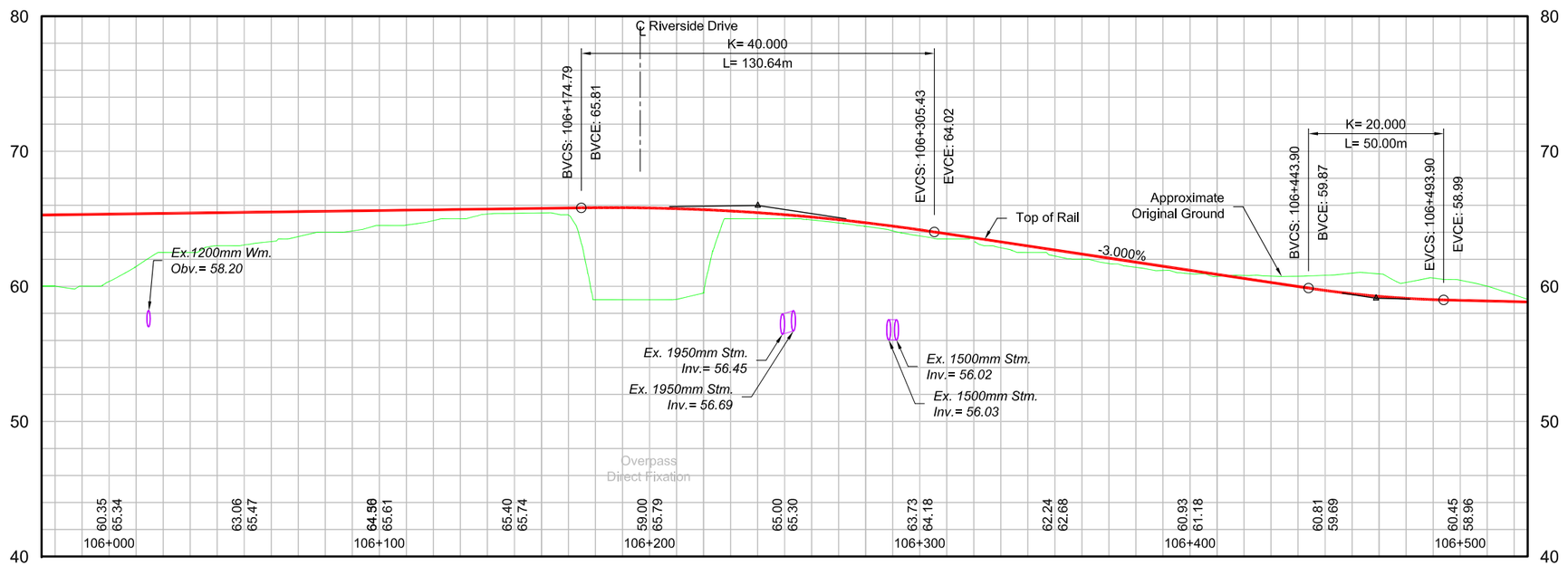


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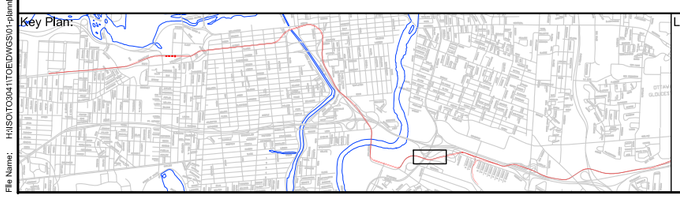

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Ottawa
Delcan
MRC McCORMICK RANKIN CORPORATION

Section:

Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-15

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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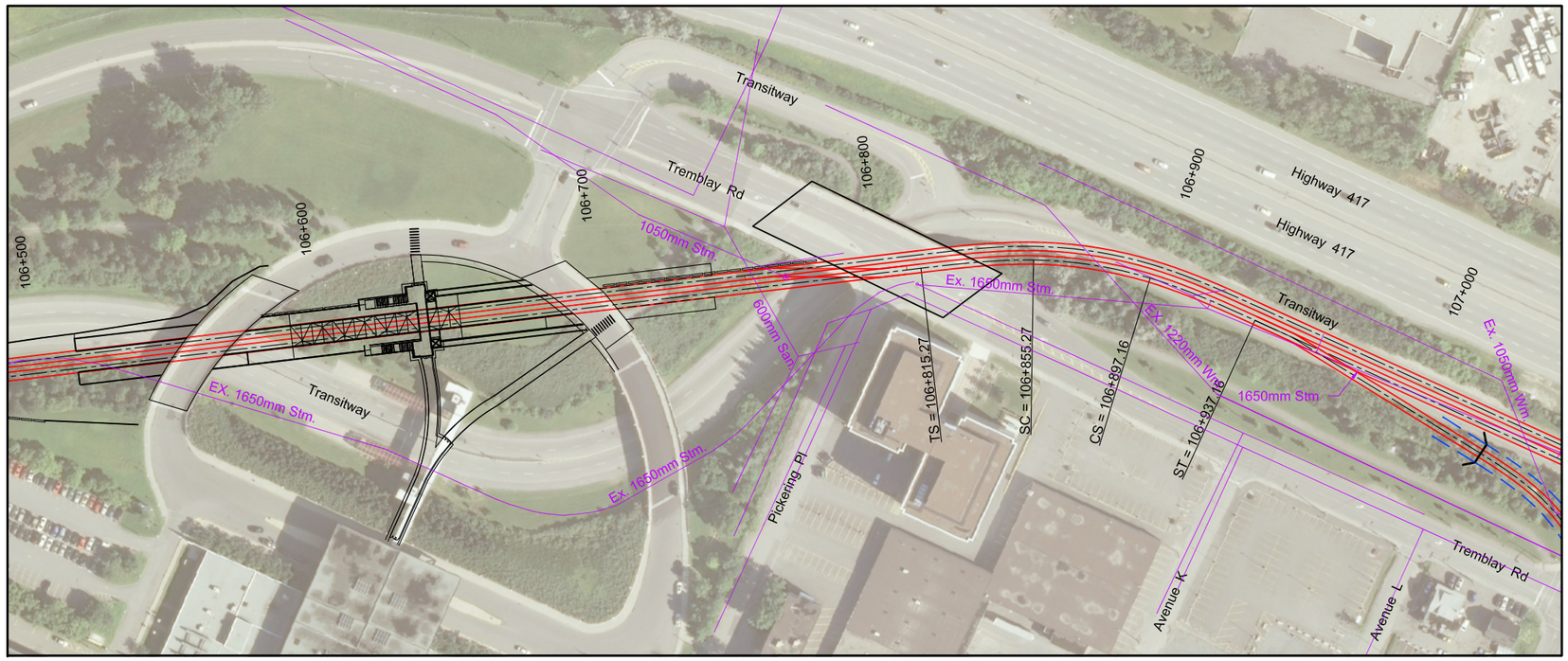
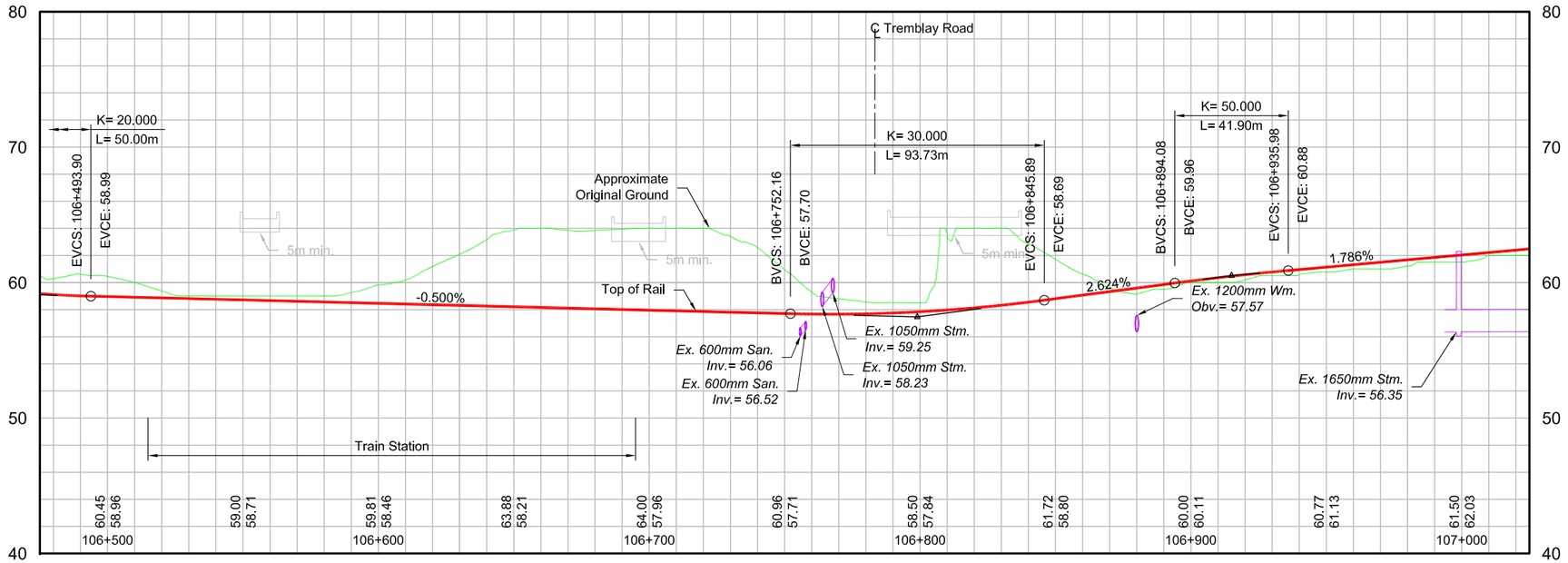
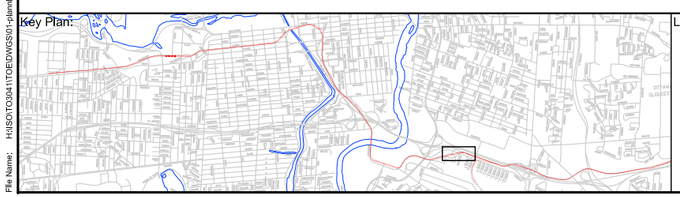



Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-16

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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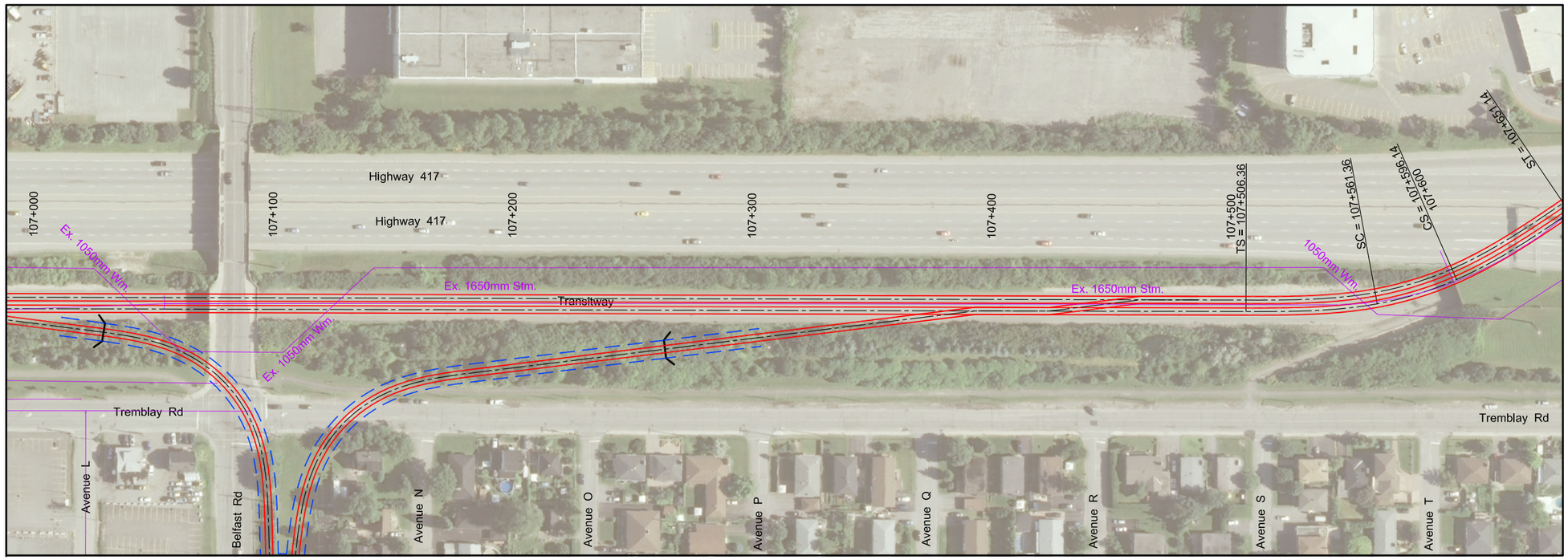



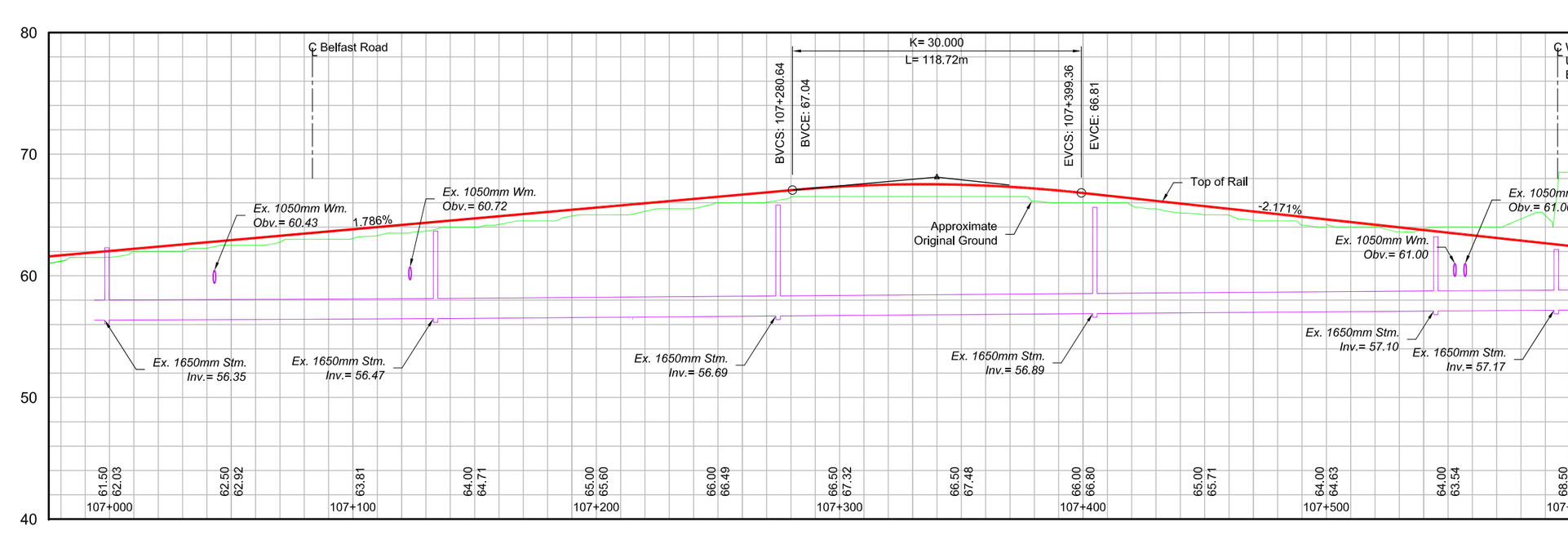


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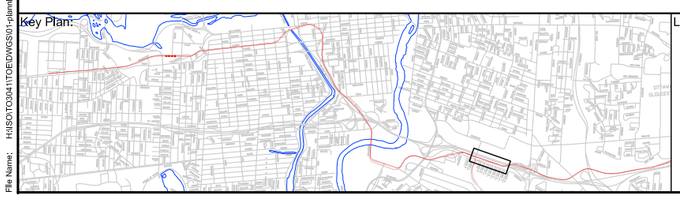

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-17

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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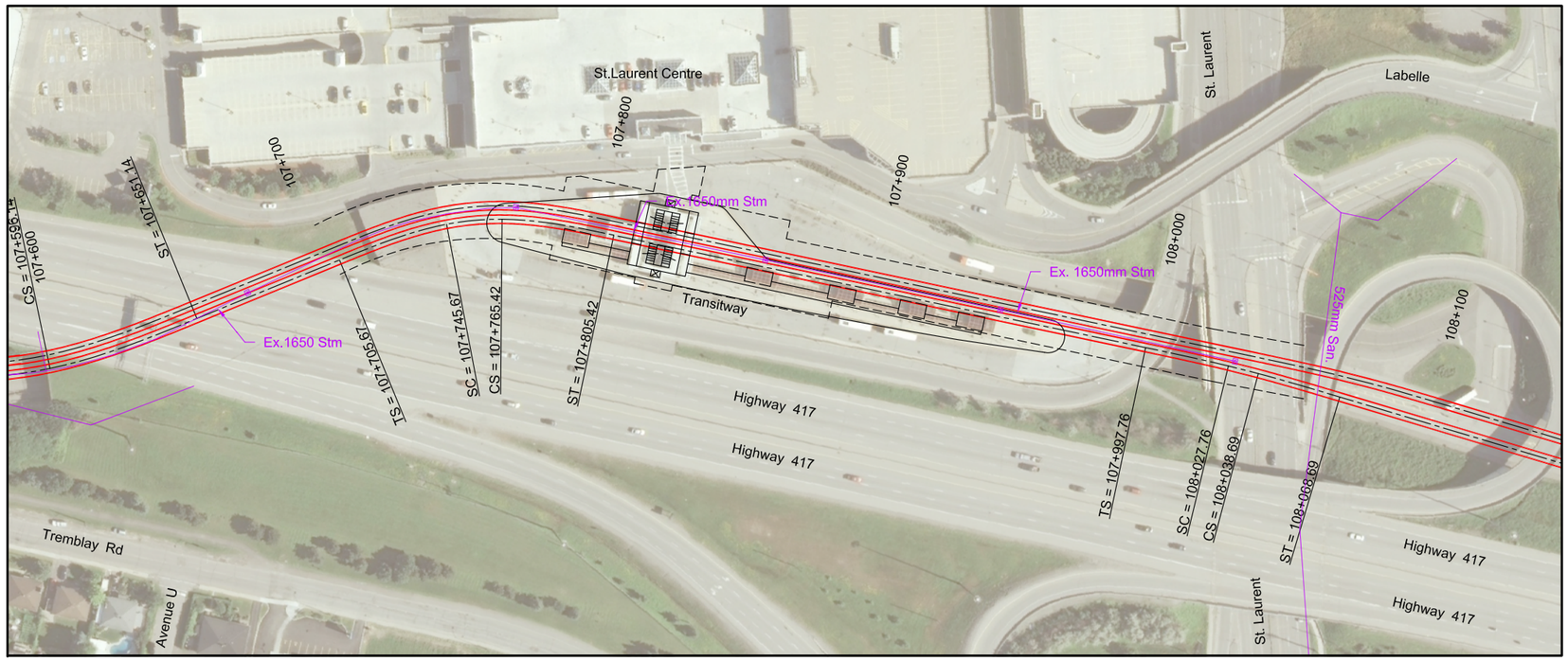
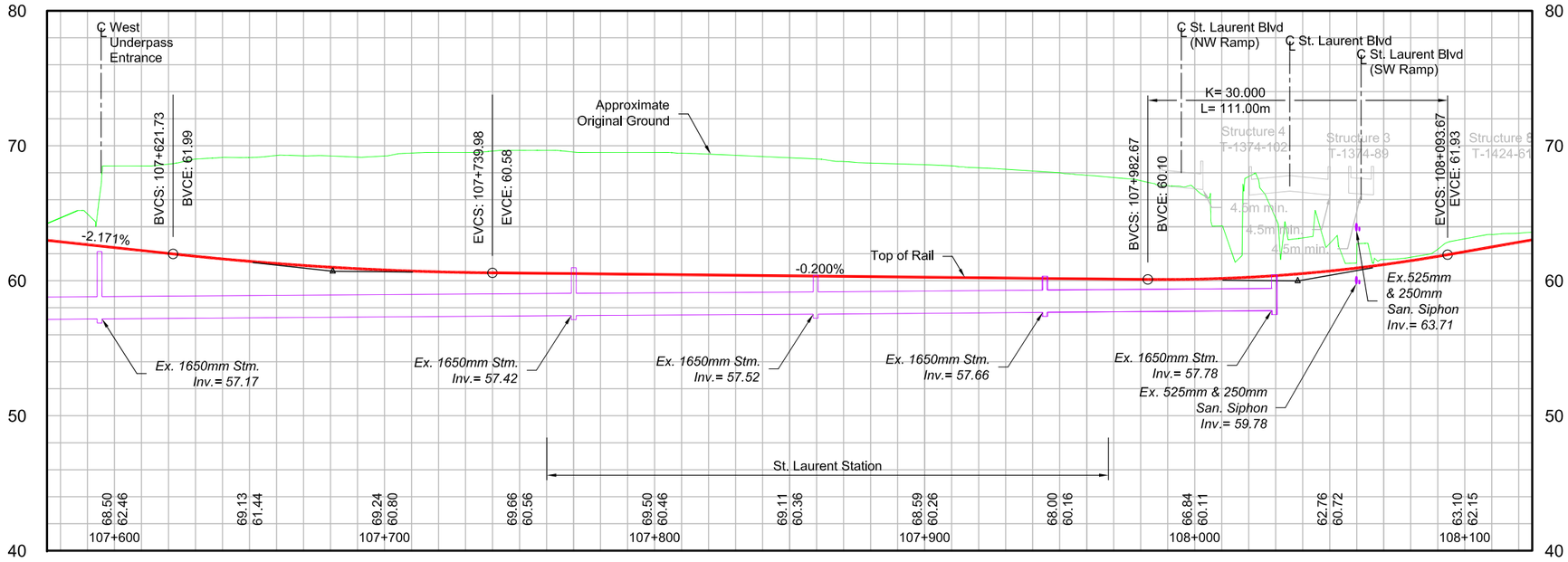
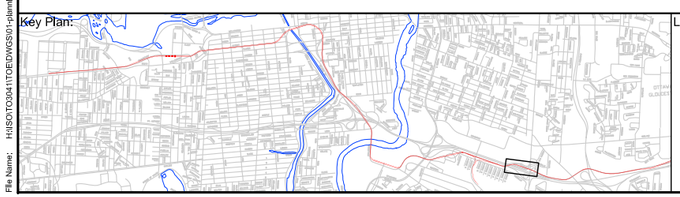



Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-18

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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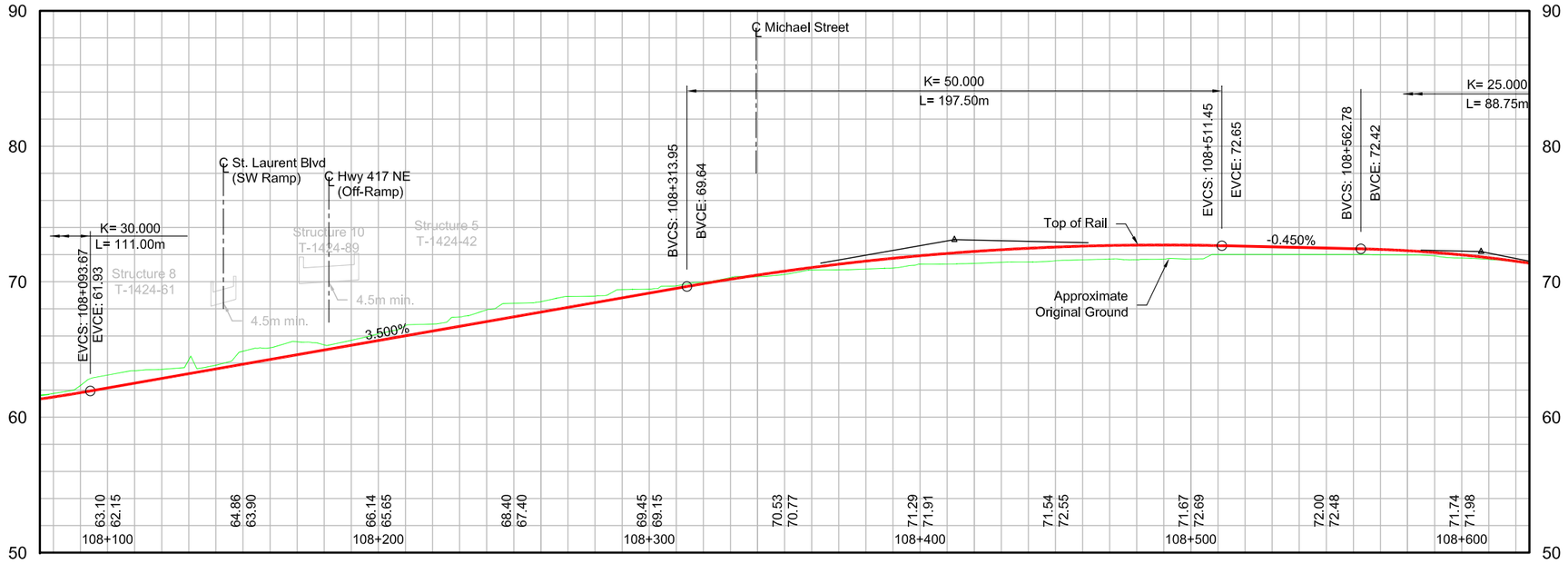



Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

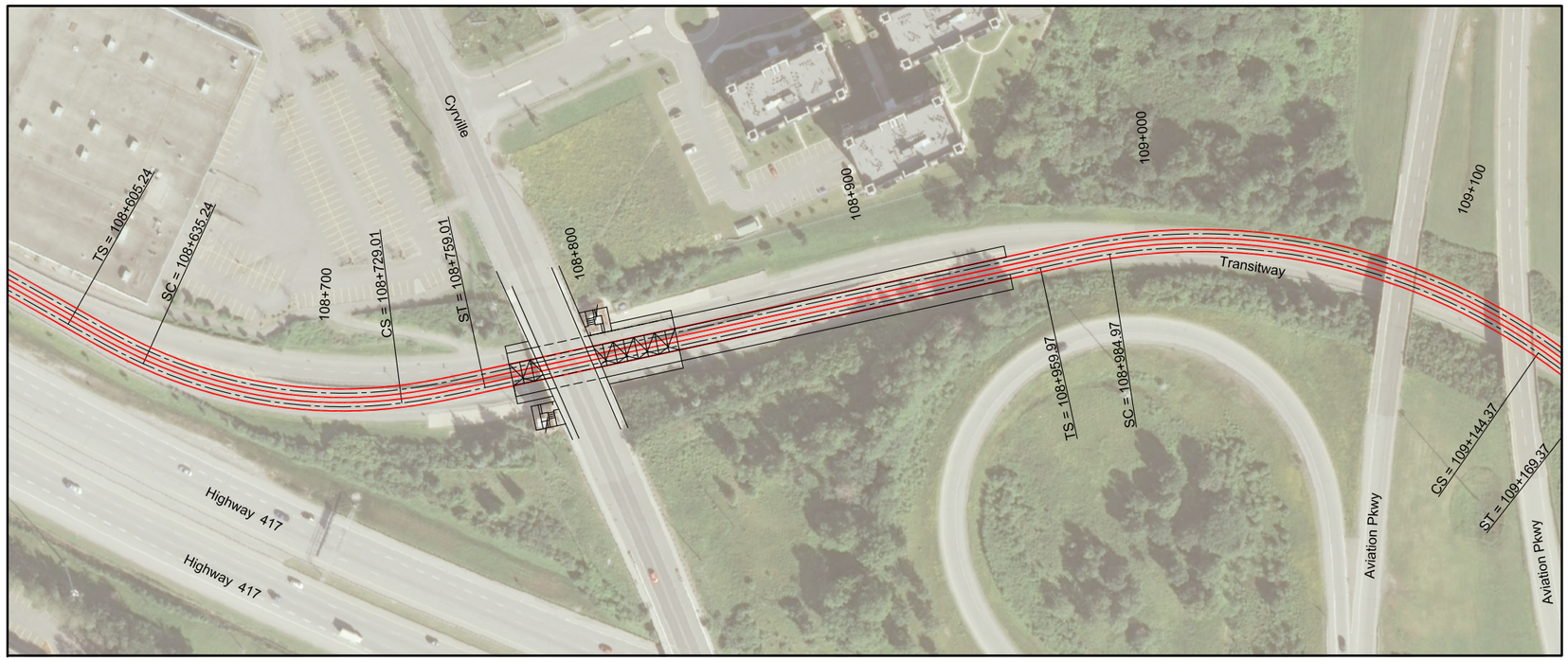
Revision: .

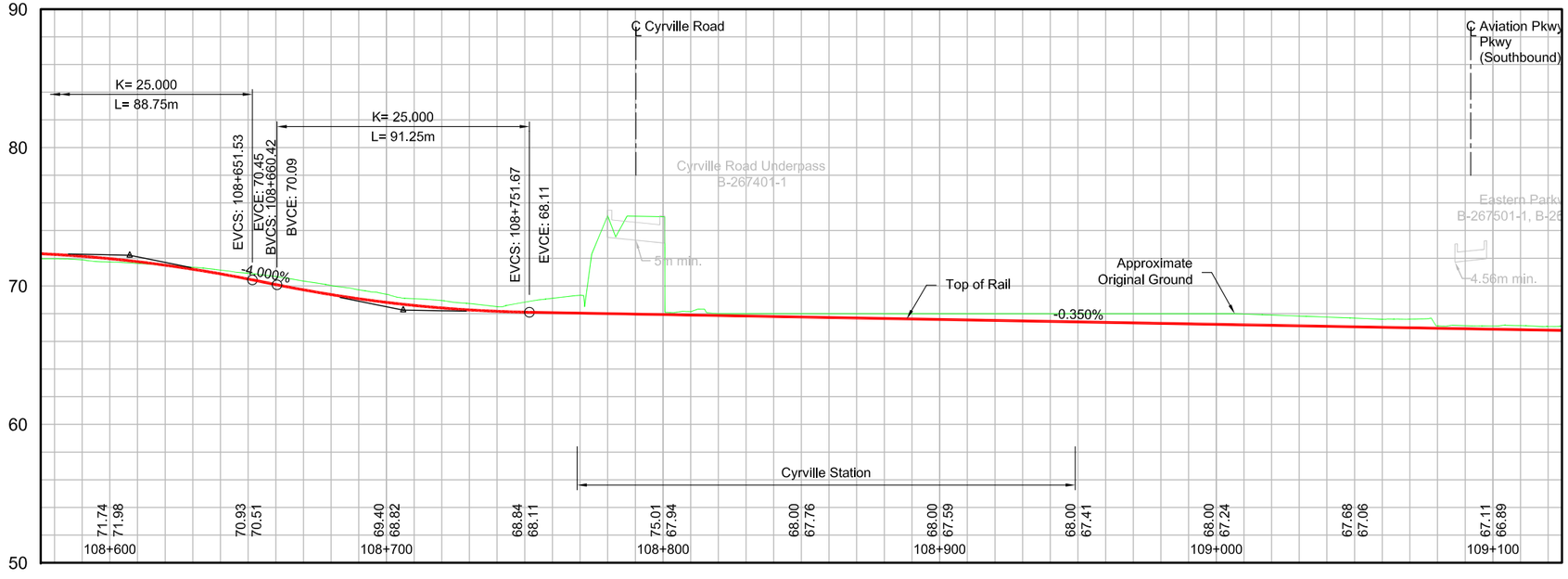
Sheet: 1-19

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: H:\SOT\O394.1\TOE\DWGS\01-planning\TO394.1TOE00_SH_1-19.dwg




Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-20

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: H:\ISO\TO\2041\TOE\DWGS\01-planning\TO2041TOE00_SN_1-20.dwg





Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 1-21

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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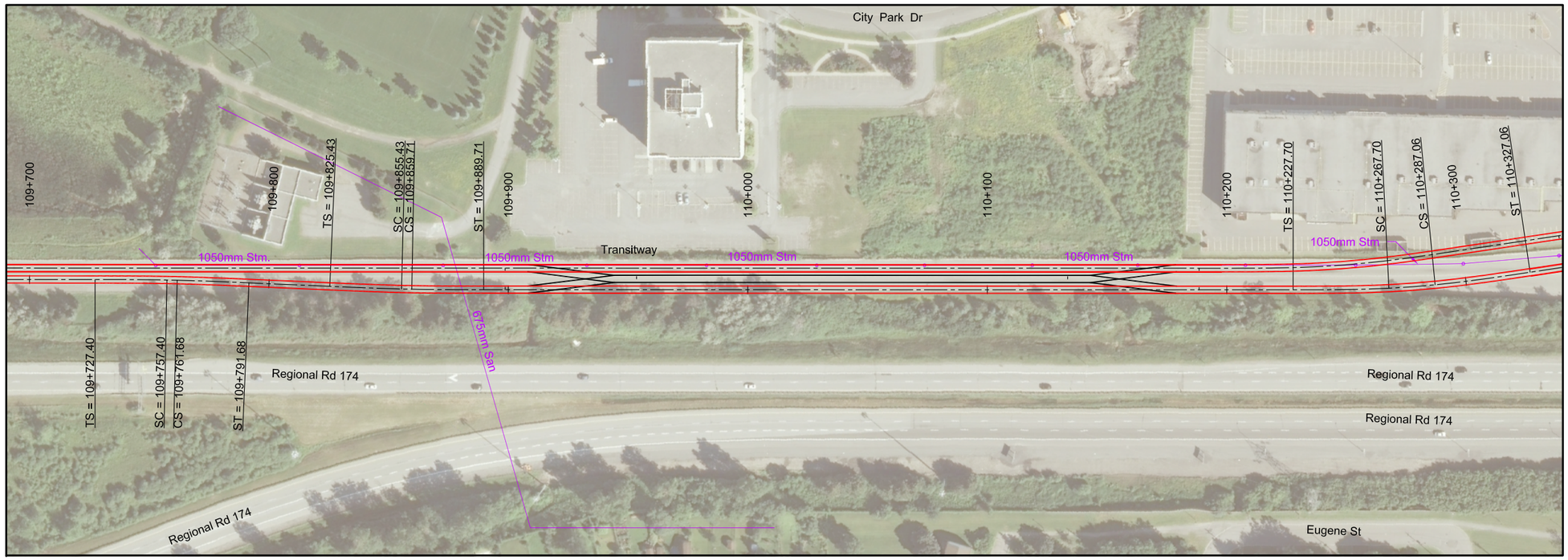
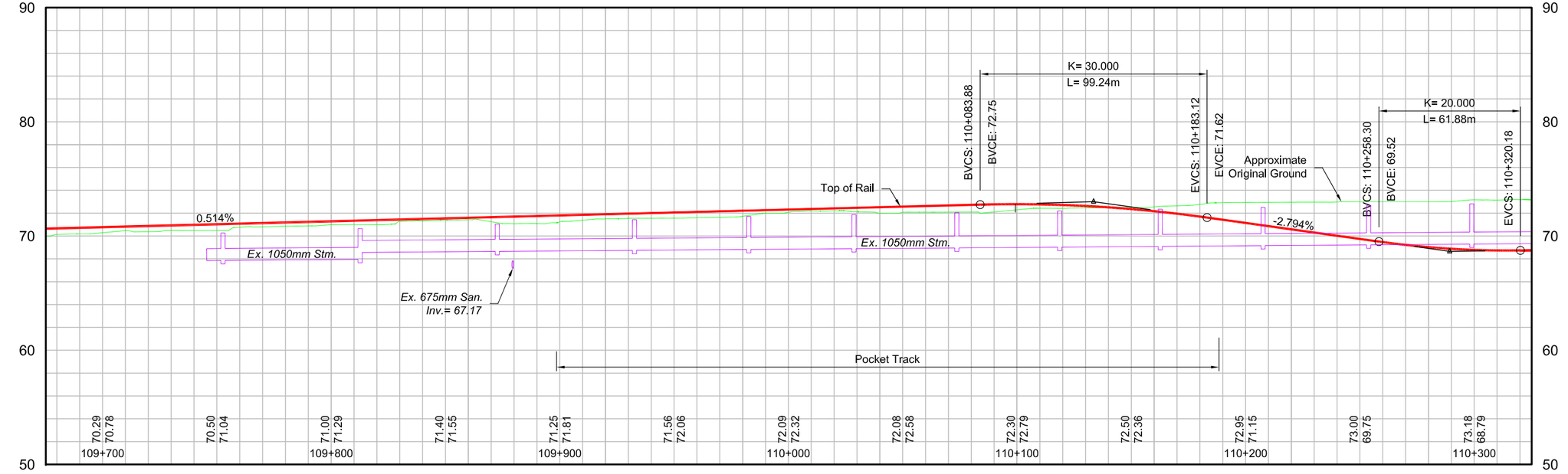
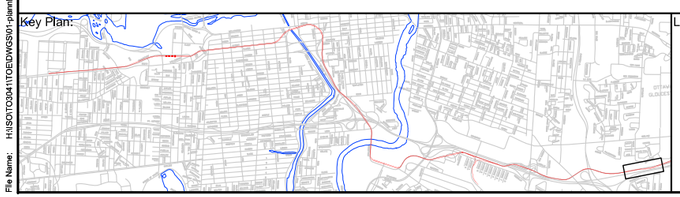



Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: 01

Sheet: 1-22

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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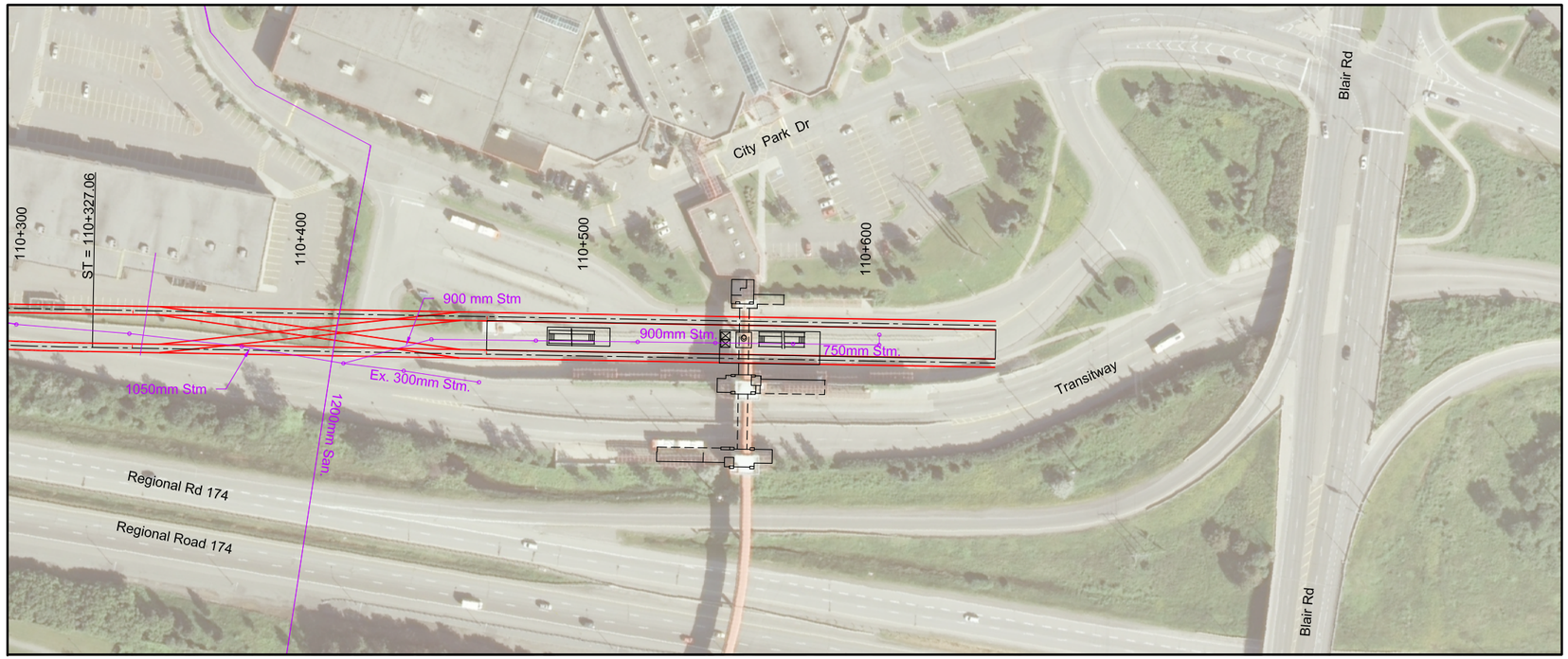
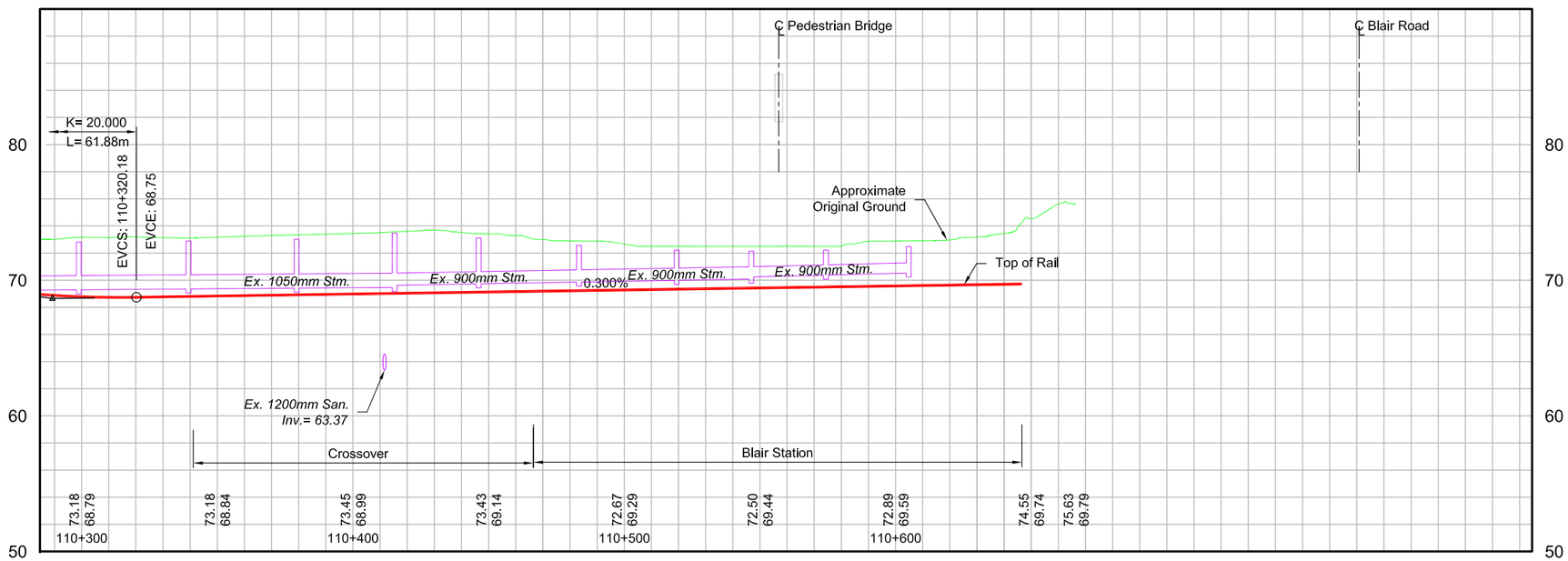



Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

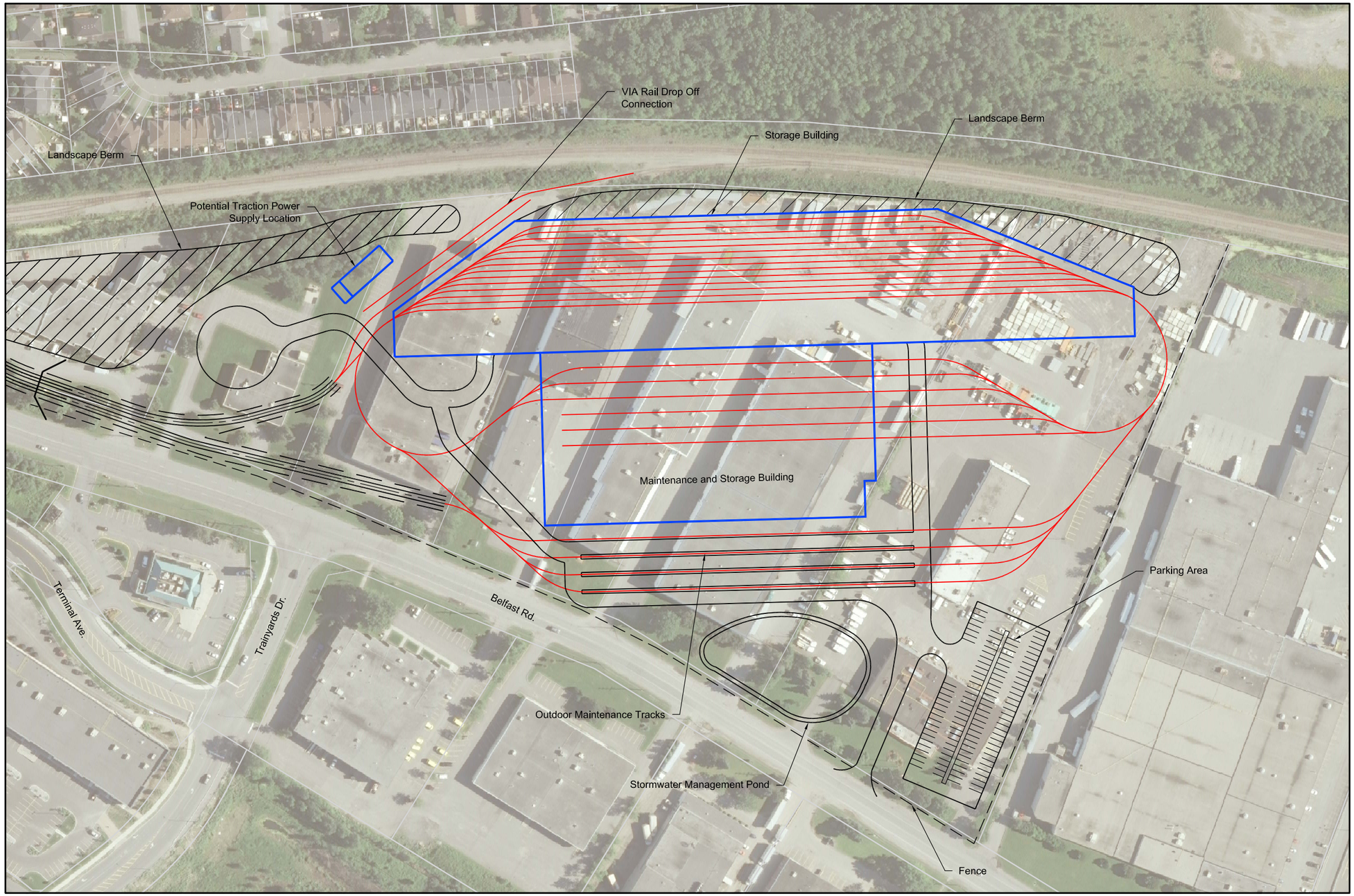
Sheet: 1-23

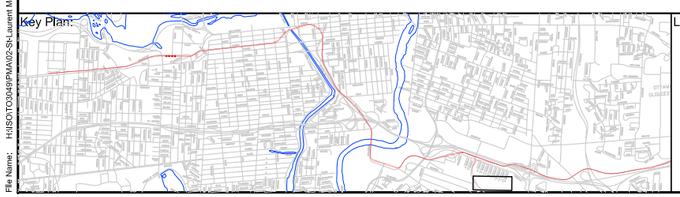
Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: H:\ISION\TO\93411\TOE\DWGS\01-planning\TO39411TOE00_Sh_1-23.dwg

# MAINTENANCE & STORAGE FACILITY PLANS




Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 20 40 80 120 160
VERTICAL

Title: Maintenance & Storage Facility

Plan Layout

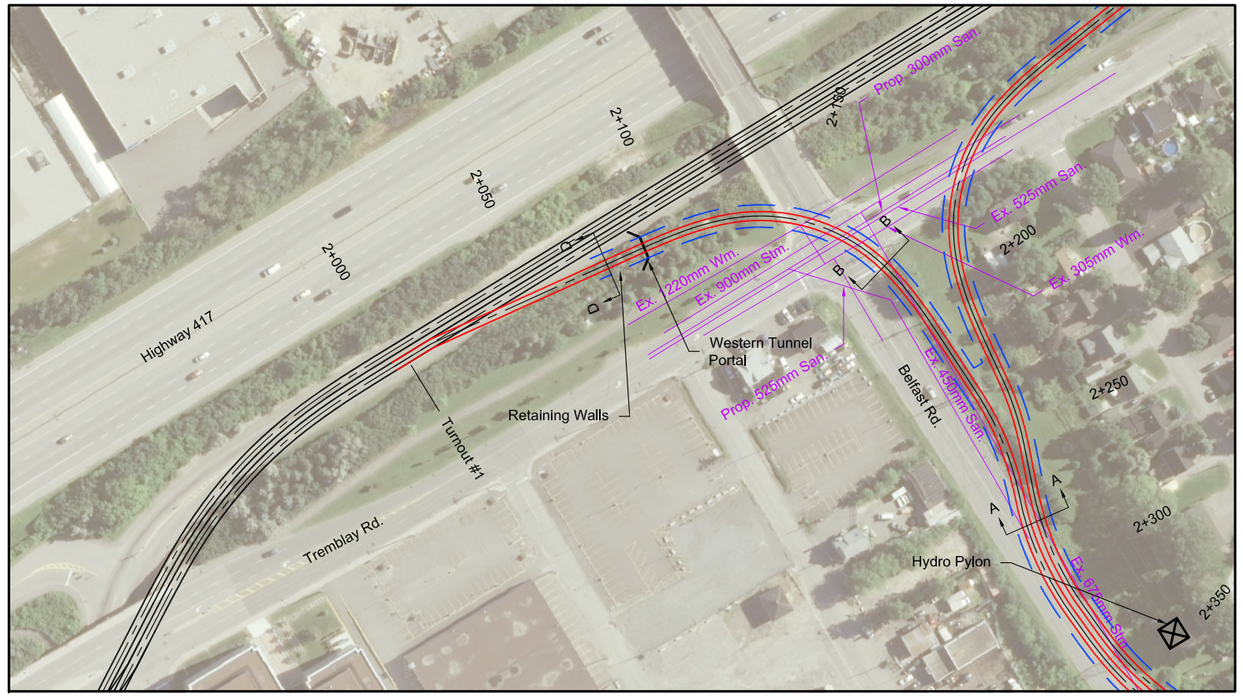
Revision: .

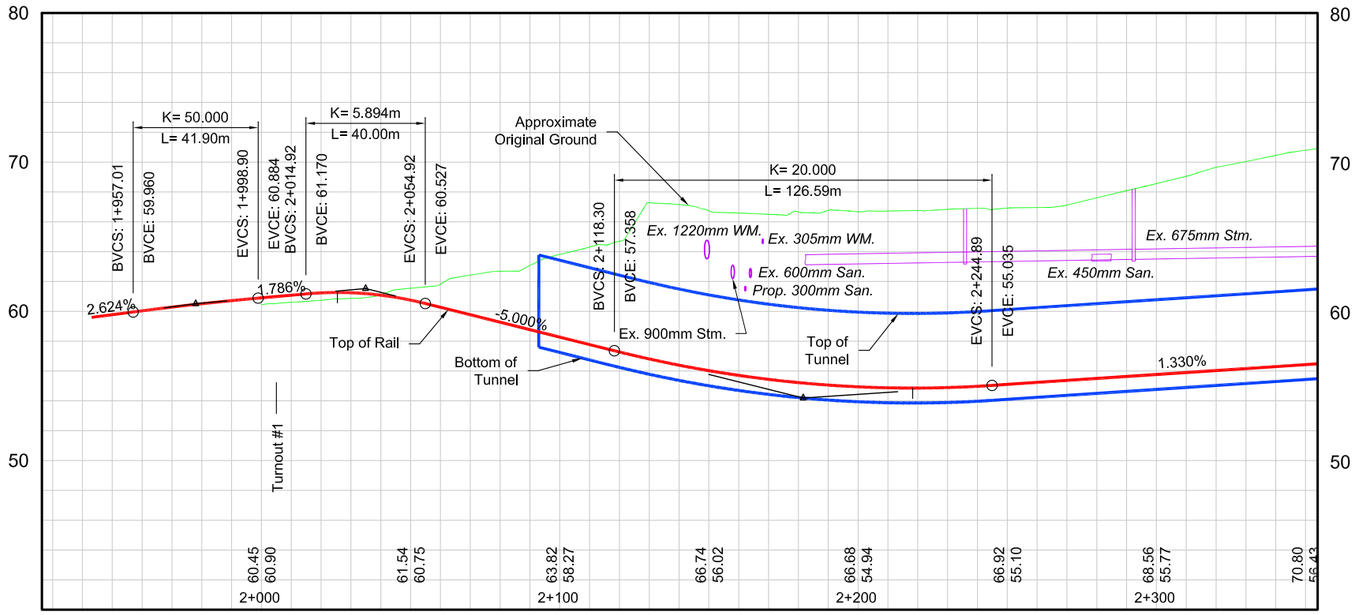
Sheet: 2-1

File Name: H:\SOT\TO\0489PMA\02-Sht-Laurent MSF Facility Functional Design\DWGS\TO3041TOE80_SHT_2-01.dwg

Last Saved: December 7, 2009

Plot Date: December 7, 2009

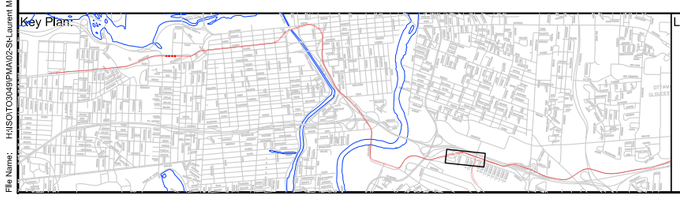



Note:

*For cross-sectional drawings refer to Maintenace & Storage Facility - Structural Drawings (Sheet X)

Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Title: Maintenance & Storage Facility

Western Connection Track 1

Revision: .

Sheet: 2-2

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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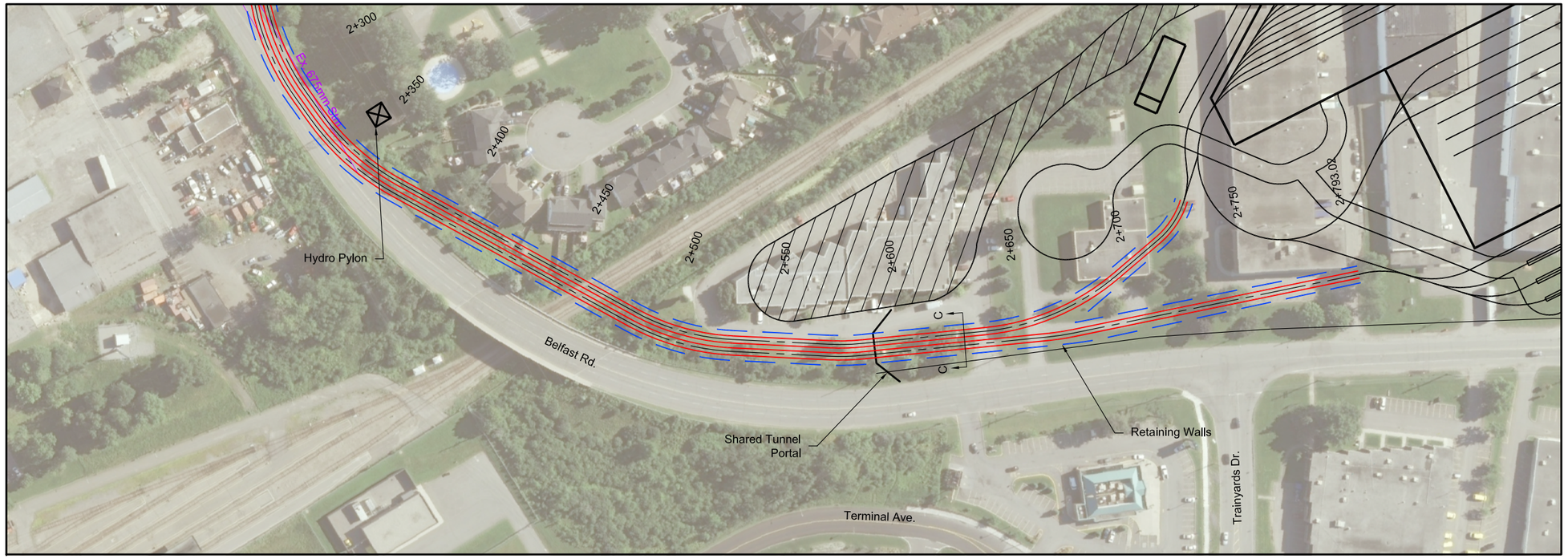
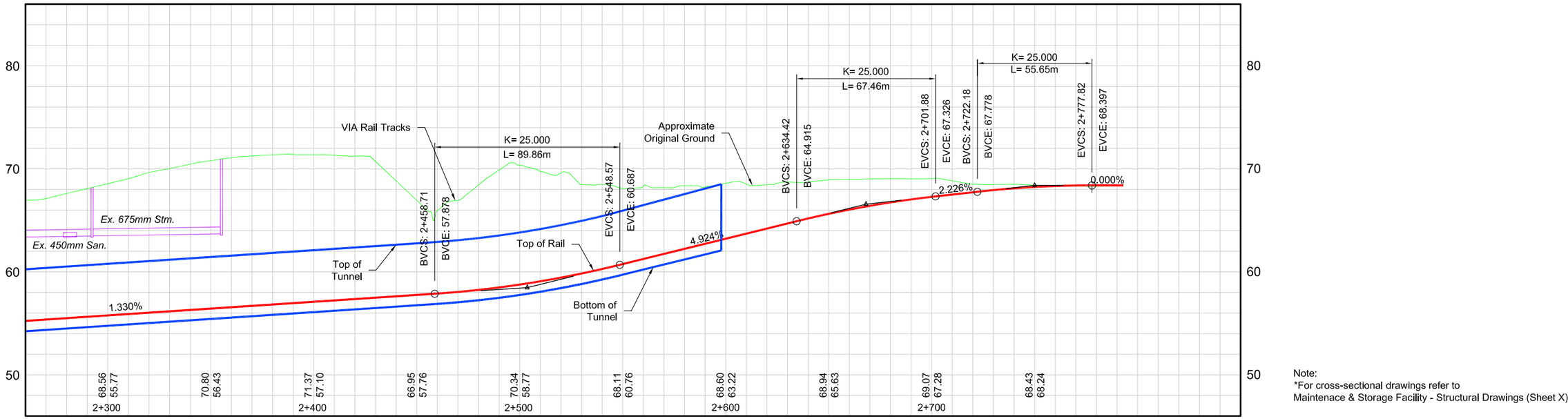
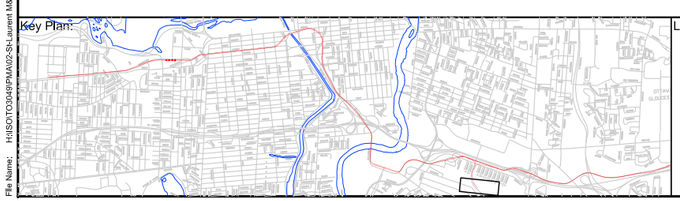



Note:
*For cross-sectional drawings refer to Maintenace & Storage Facility - Structural Drawings (Sheet X)

Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

Ottawa

Delcan

Title:

## Maintenance & Storage Facility

Western Connection
Track 2

Revision: .

Sheet: 2-3

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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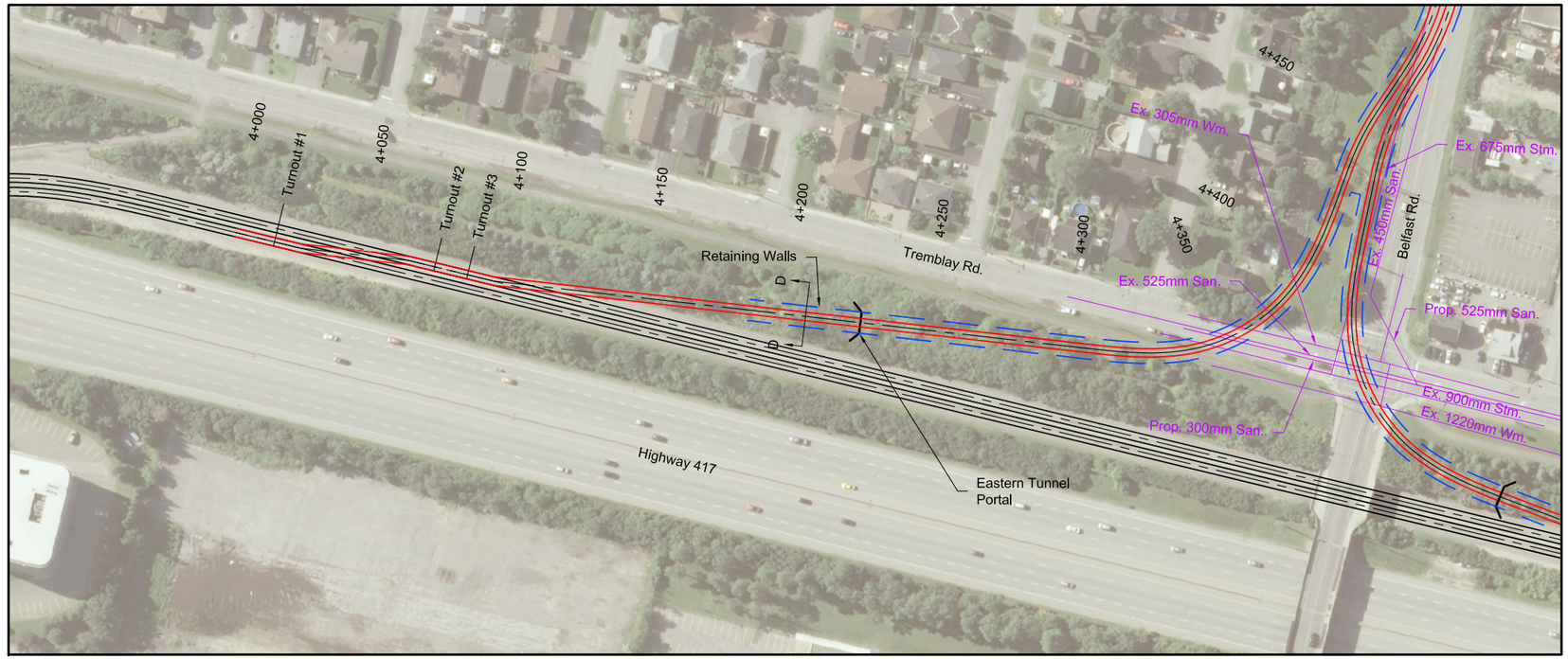
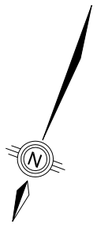
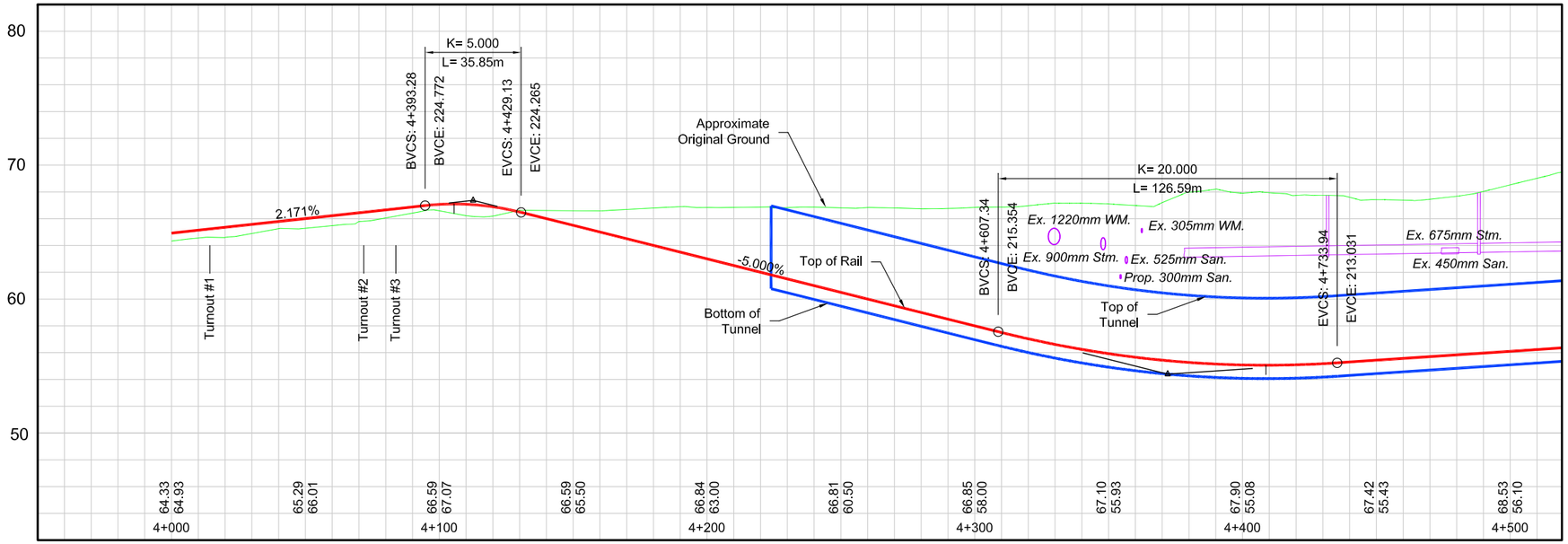
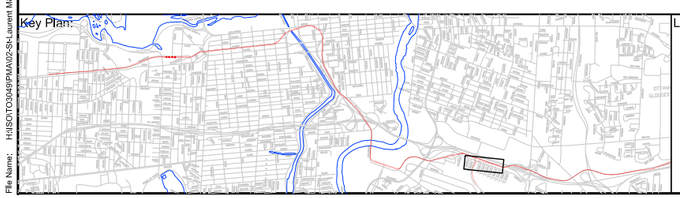



Note:
*For cross-sectional drawings refer to Maintenace & Storage Facility - Structural Drawings (Sheet X)

Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa

Delcan

Title:

## Maintenance & Storage Facility

Eastern Connection
Track 1

Revision: .

Sheet: 2-4

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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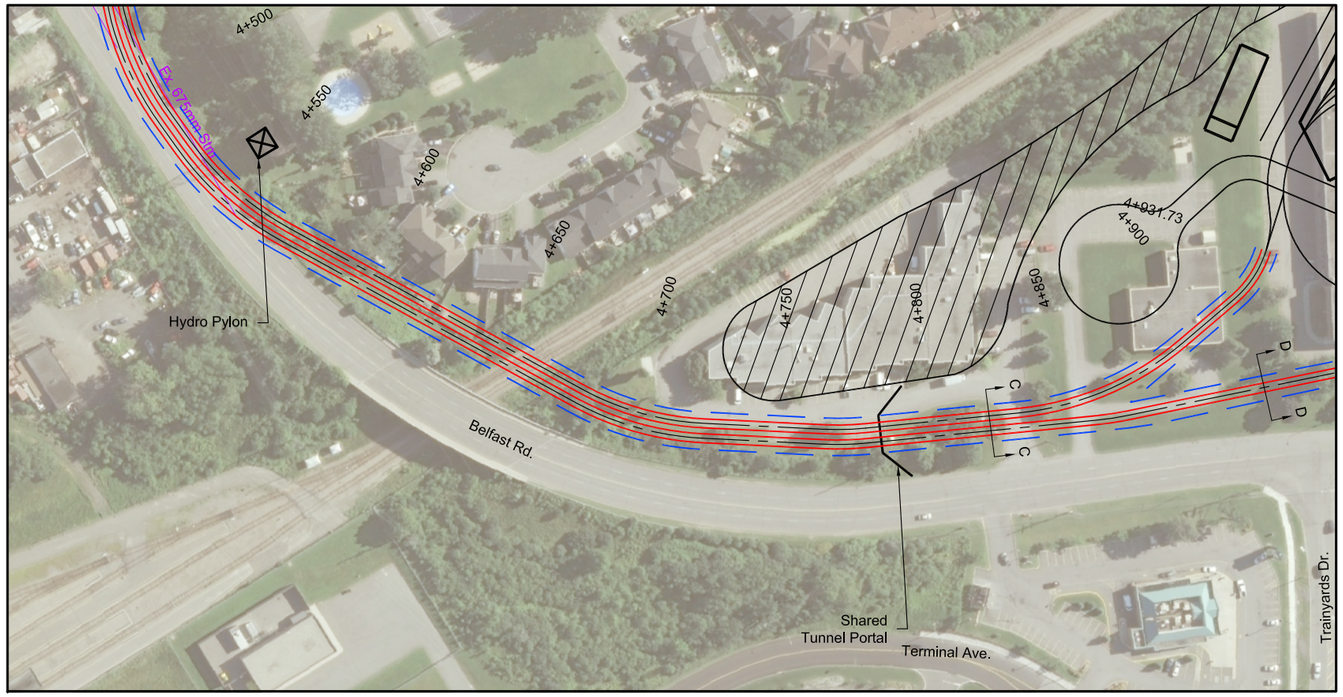
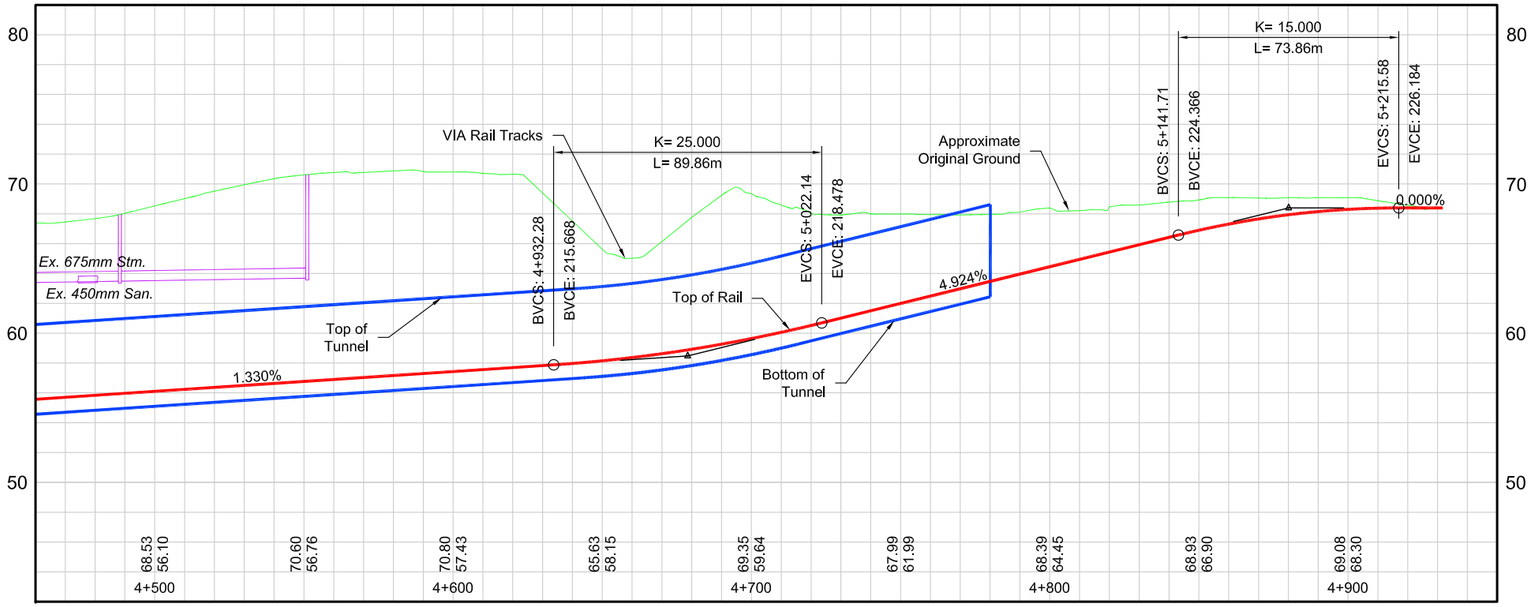
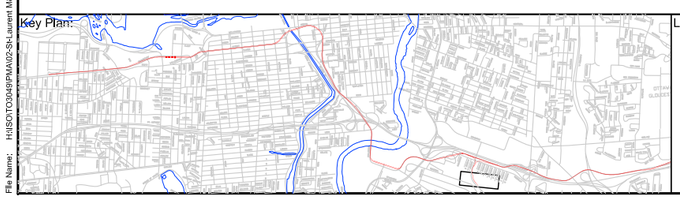







Note:
*For cross-sectional drawings refer to
Maintenace & Storage Facility - Structural Drawings (Sheet X)

Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa

Delcan

Title:

## Maintenance & Storage Facility

Eastern Connection
Track 2

Revision: .

Sheet: 2-5

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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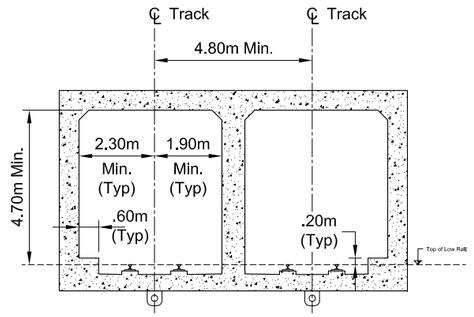
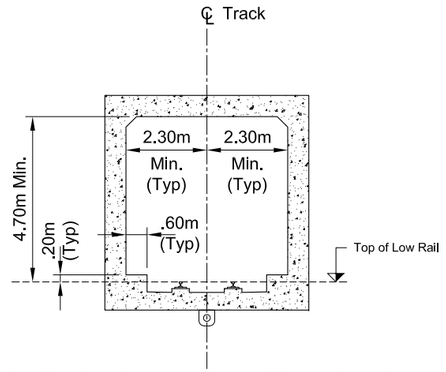
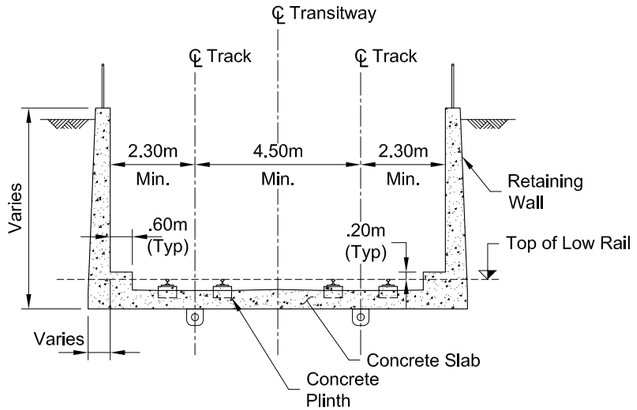


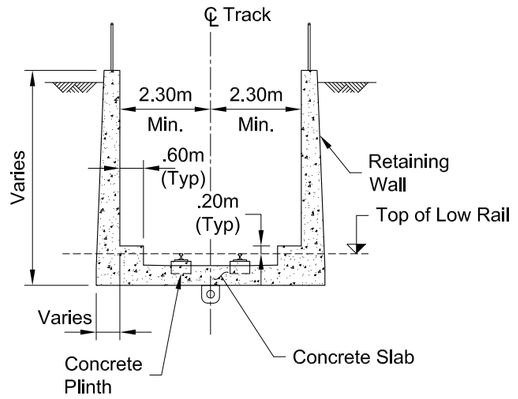

Section A - A Cut and Cover Double Box Section



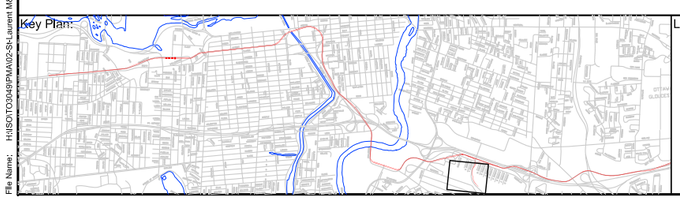

Section B - B Cut and Cover Single Box Section




Section C - C Typical Double Track Tunnel Portal Structure




Section D - D Typical Single Track Tunnel Portal Structure




Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 1 2 4 8 12 16

VERTICAL 0m 1 2 4 8 12 16

Title:

## Maintenance & Storage Facility Connectivity

Structural Drawings

Revision: .

Sheet: 2-6

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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# STATION PLANS

FINANCE ANNEX

GOLDENROD DRIVE

YARROW

TUNNEY'S PASTURE STATION

TUNNEY'S PASTURE DRIVE

TUNNEY'S PASTURE DRIVE

R.H. COATES

BRT PLATFORM

DN

ELEVATOR AND CORRIDOR TO LRT PLATFORM

STATION ENTRY

GREEN ROOF WITH GLAZED MID-SECTION

DN

DN DN

ELEVATOR DOWN TO PLATFORM

DN

DN DN

STATION ENTRY

LOCAL BUS PLATFORMS

SCOTT

SMIRLE

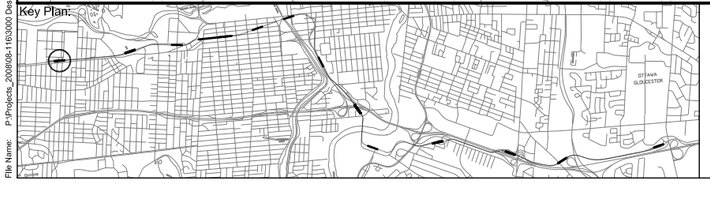
CAROLINE

HURON

HOLLAND

HOLLAND CROSS

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
TUNNEY'S PASTURE
PLAN
GRADE LEVEL
DOTT-001-A100

| Scale: | Revision: | Sheet: |
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Last Saved: December 7, 2009
Plot Date: December 7, 2009

FINANCE ANNEX

GOLDENROD DRIVE

YARROW

TUNNEY'S PASTURE STATION

TUNNEY'S PASTURE DRIVE

TUNNEY'S PASTURE DRIVE

R.H. COATES

BRT PLATFORM ABOVE

ELEVATOR UP TO BRT PLATFORM

UP

BRT PLATFORM ABOVE

UP

STATION ENTRY ABOVE

ELEVATOR UP TO GRADE

UP

UP

PEDESTRIAN BRIDGE ABOVE

UP

UP

UP

PEDESTRIAN CROSSING AT TRACK LEVEL

120 M

60 M FUTURE

STATION ENTRY ABOVE

SCOTT

SMIRLE

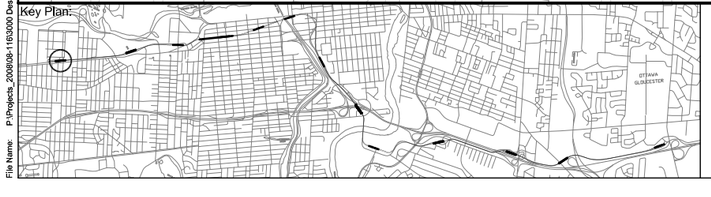
CAROLINE

HURON

HOLLAND

HOLLAND CROSS

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL

0m 20 40 80 120 160

0m 4 8 16 24 32

VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:

TUNNEY'S PASTURE
PLAN
PLATFORM LEVEL
DOTT-001-A001

| Scale: | Revision: | Sheet: |
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| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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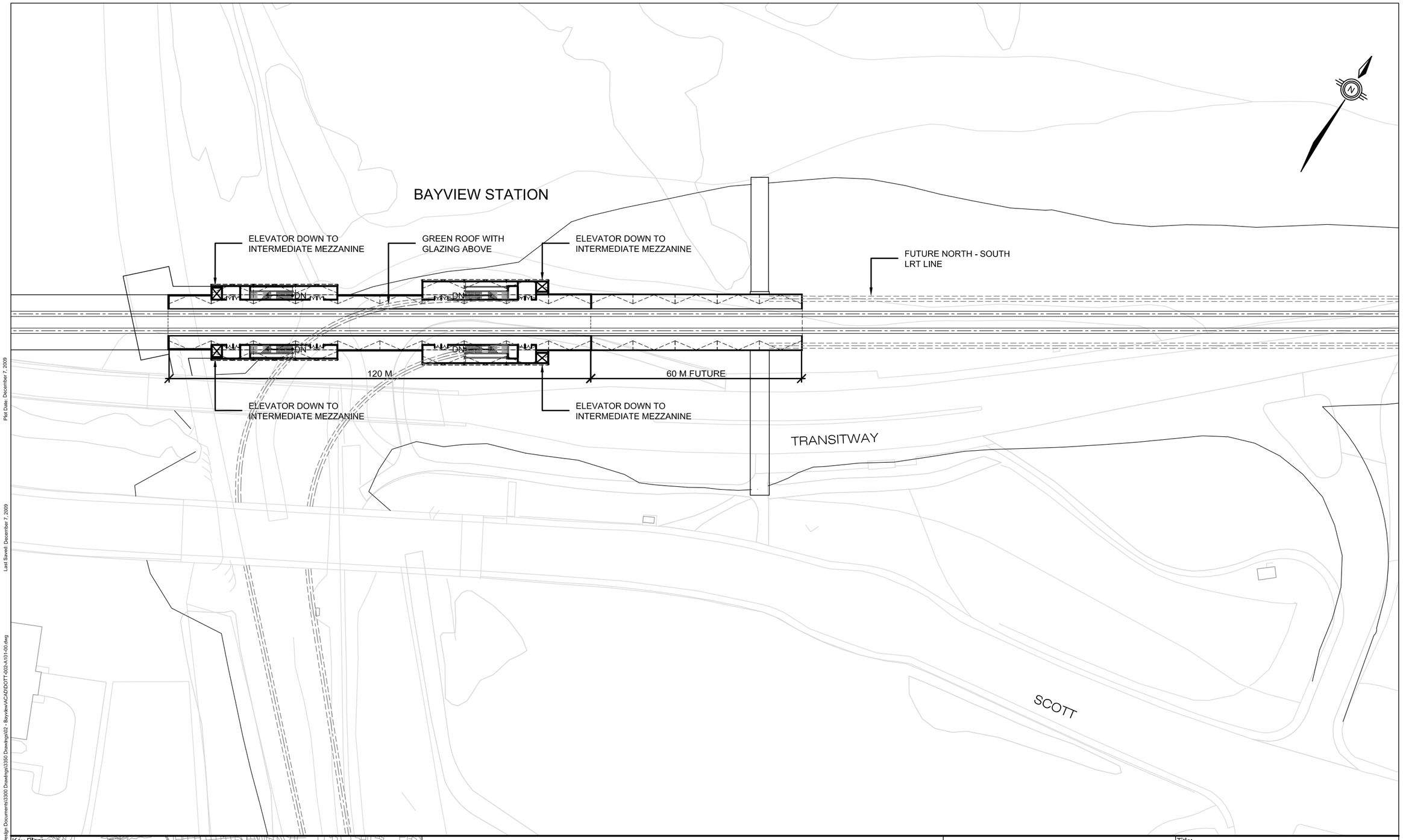


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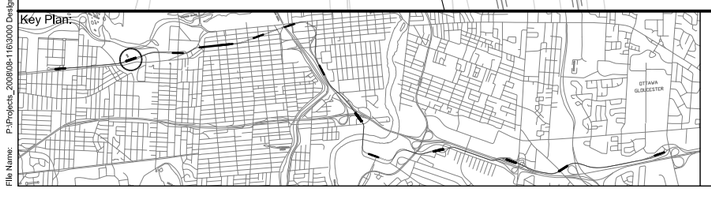


# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BAYVIEW
PLAN
E/W LRT - PLATFORM LEVEL
DOTT-002-A101

| Scale: | Revision: | Sheet: |
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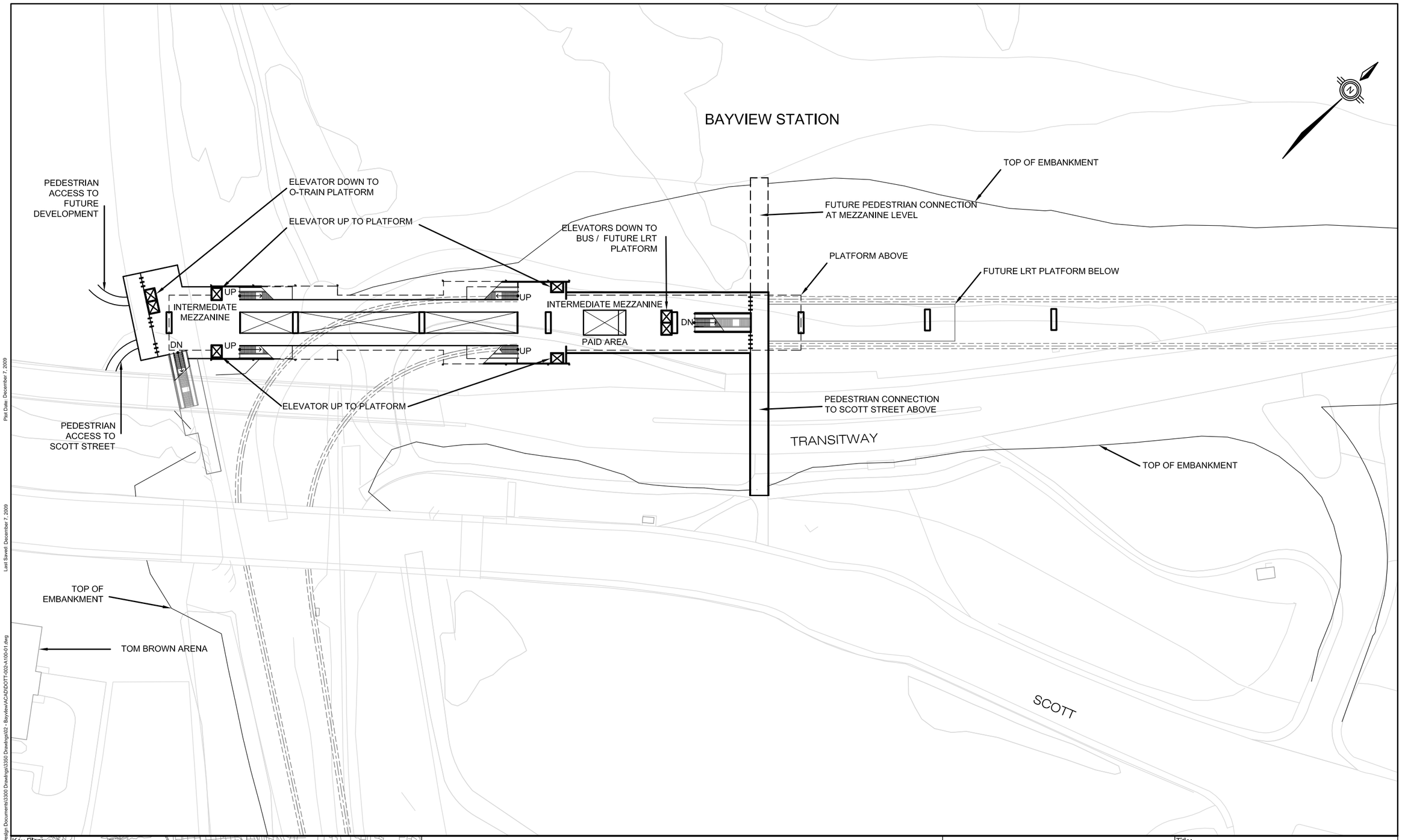
Plot Date: December 7, 2009

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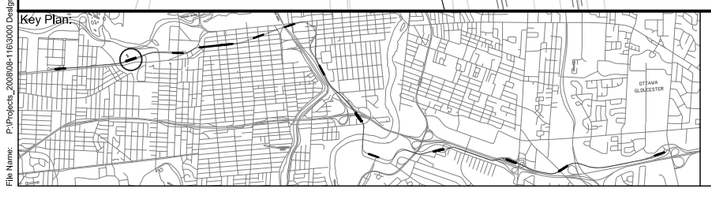

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa
Delcan
MRC McCORMICK RANKIN CORPORATION
A member of SNC-Lavalin

**grc architects** / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BAYVIEW
PLAN
GRADE / MEZZANINE LEVEL
DOTT-002-A100

| Scale: | Revision: | Sheet: |
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| 1:500 | 00 | |

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Last Saved: December 7, 2009
Plot Date: December 7, 2009

BAYVIEW STATION

POTENTIAL INTERPROVINCIAL TRANSIT CONNECTION VIA PRINCE OF WALES BRIDGE

TOP OF EMBANKMENT

INTERMEDIATE MEZZANINE ABOVE

ELEVATORS UP TO INTERMEDIATE MEZZANINE

ELEVATORS UP TO INTERMEDIATE MEZZANINE

FUTURE PEDESTRIAN CONNECTION AT MEZZANINE LEVEL

UP

BUS PLATFORM

UP

INTERIM O-TRAIN PLATFORM

PEDESTRIAN CONNECTION TO SCOTT STREET ABOVE

TRANSITWAY

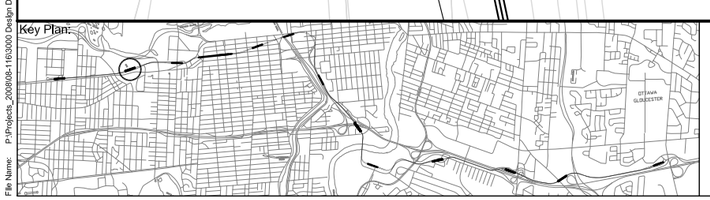
TOP OF EMBANKMENT

TOM BROWN ARENA

TOP OF EMBANKMENT

SCOTT

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BAYVIEW
PLAN
N/S LRT, PLATFORM LEVEL
DOTT-002-A001-A

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: P:\Projects_2008\08-1193\000 Design Documents\3300 Drawings\3350 Drawings\02 - Bayview\ACAD\DOTT-002-A001-00.dwg

BAYVIEW STATION

POTENTIAL INTERPROVINCIAL TRANSIT CONNECTION VIA PRINCE OF WALES BRIDGE

TOP OF EMBANKMENT

INTERMEDIATE MEZZANINE ABOVE

ELEVATORS UP TO INTERMEDIATE MEZZANINE

ELEVATORS UP TO INTERMEDIATE MEZZANINE

FUTURE PEDESTRIAN CONNECTION AT MEZZANINE LEVEL

UP

LRT PLATFORM

UP

INTERIM O-TRAIN PLATFORM

PEDESTRIAN CONNECTION TO SCOTT STREET ABOVE

TRANSITWAY

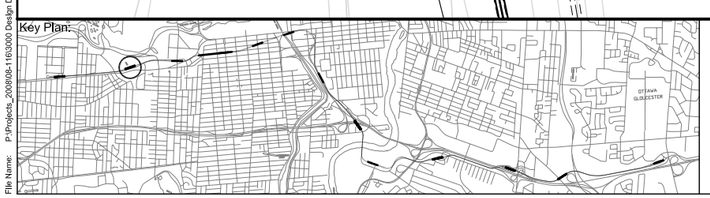
TOP OF EMBANKMENT

TOM BROWN ARENA

TOP OF EMBANKMENT

SCOTT

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BAYVIEW
PLAN
N/S LRT, PLATFORM LEVEL
DOTT-002-A001-B

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009
Last Saved: December 7, 2009
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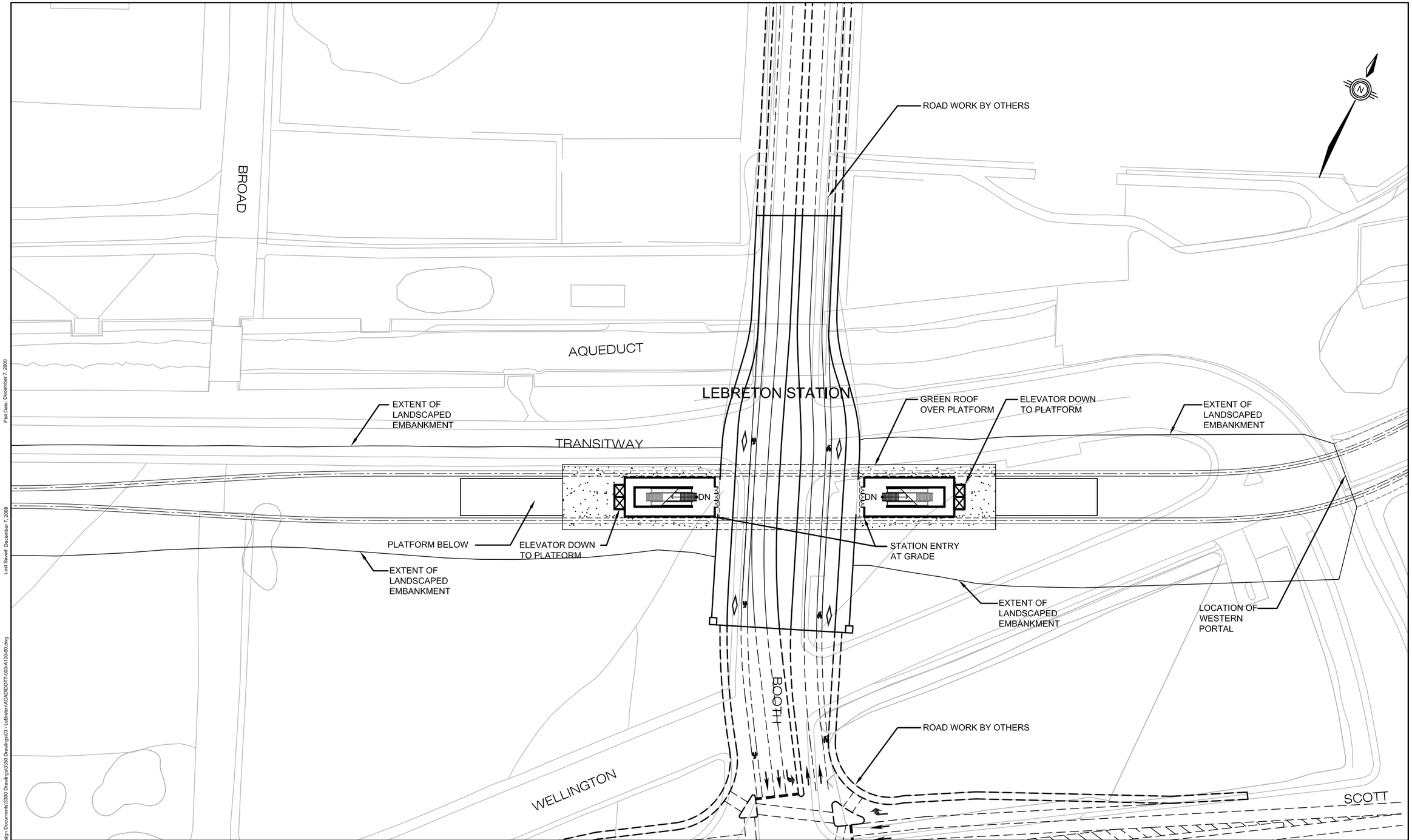


Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
LEBRETON
PLAN
GRADE LEVEL
DOTT-003-A100

| Scale: | Revision: | Sheet: |
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Plot Date: December 7, 2009
Last Saved: December 7, 2009
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BROAD

AQUEDUCT

LEBRETON STATION

NEW BOOTH STREET BRIDGE ABOVE

TRANSITWAY

UP

UP

OUTLINE OF STATION ENTRY ABOVE

OUTLINE OF STATION ENTRY ABOVE

ELEVATOR UP TO GRADE

ELEVATOR UP TO GRADE

30 M FUTURE

120 M

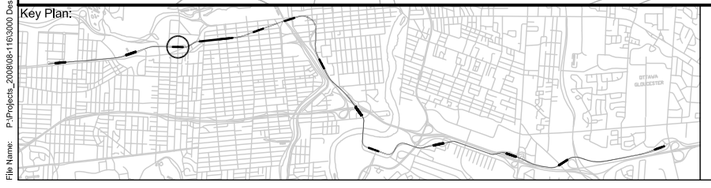
30 M FUTURE

BOOTH

WELLINGTON

SCOTT

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan MRC McCORMICK RANKIN CORPORATION

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
LEBRETON STATION
PLAN
PLATFORM LEVEL
DOTT-003-A001

| Scale: | Revision: | Sheet: |
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Plot Date: December 7, 2009
Last Saved: December 7, 2009
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QUEEN

PARK SQUARE CONDO

CROWNE PLAZA HOTEL

PLACE DE VILLE

DOWNTOWN WEST STATION

POTENTIAL
VENT SHAFT LOCATION

STATION ENTRY AT GRADE

OUTLINE OF STATION BELOW

DN

OUTLINE OF STATION BELOW

ALBERT

OUTLINE OF CONCOURSE
LEVEL BELOW

DN

OUTLINE OF CONCOURSE
LEVEL BELOW

POTENTIAL VENT SHAFT
LOCATION

POTENTIAL CONNECTION TO
CONSTITUTION SQUARE -
NOT IN CONTRACT

STATION ENTRY AT GRADE

CONSTITUTION SQUARE

FUTURE CITY OF OTTAWA
PUBLIC LIBRARY SITE

BAY

LYON N

SLATER

KENT

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-116\3000 Design Documents\3300 Drawings\3350 Drawings\04 - 05 Downtown-East&West\ACAD\DOTT-004-A100-00.dwg

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN WEST
PLAN
GRADE LEVEL
DOTT-004-A100

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

QUEEN

PARK SQUARE CONDO

CROWNE PLAZA HOTEL

PLACE DE VILLE

DOWNTOWN WEST STATION

POTENTIAL VENT SHAFT LOCATION

ELEVATORS AND STAIRS TO MAIN STATION ENTRANCE ABOVE

OUTLINE OF ENTRANCE ABOVE

ELEVATORS AND STAIRS TO PLATFORM BELOW

UP

DN

DN

UP

ALBERT

ELEVATORS AND STAIRS TO PLATFORM BELOW

OUTLINE OF ENTRANCE ABOVE

ELEVATORS AND STAIRS TO MAIN STATION ENTRANCE ABOVE

POTENTIAL VENT SHAFT LOCATION

FUTURE CITY OF OTTAWA PUBLIC LIBRARY SITE

CONSTITUTION SQUARE

BAY

LYON N

SLATER

KENT

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN WEST
PLAN
CONCOURSE LEVEL
DOTT-004-A002

Scale: 1:500
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Last Saved: December 7, 2009
Plot Date: December 7, 2009

QUEEN

PARK SQUARE CONDO

CROWNE PLAZA HOTEL

PLACE DE VILLE

POTENTIAL VENT SHAFT LOCATION

OUTLINE OF ENTRANCE ABOVE

BUILDING SERVICES

DOWNTOWN WEST STATION

180 M

BUILDING SERVICES

OUTLINE OF CONCOURSE ABOVE

UP

UP

ALBERT

ESCALATOR UP TO CONCOURSE

ELEVATOR UP TO CONCOURSE

OUTLINE OF ENTRANCE ABOVE

ELEVATOR UP TO CONCOURSE

OUTLINE OF CONCOURSE ABOVE

ESCALATOR UP TO CONCOURSE

CONSTITUTION SQUARE

POTENTIAL VENT SHAFT LOCATION

FUTURE CITY OF OTTAWA PUBLIC LIBRARY SITE

BAY

LYON N

SLATER

KENT

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN WEST
PLAN
PLATFORM LEVEL
DOTT-004-A003

Scale: 1:500
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Last Saved: December 7, 2009
Plot Date: December 7, 2009

BANK

SPARKS

203-209 QUEEN

CBC BUILDING

HERITAGE PLACE

QUEEN

OCONNOR

131 QUEEN

POTENTIAL ENTRY AT
SPARKS - NOT IN PROJECT

POTENTIAL VENT SHAFT
LOCATION

PLATFORM
BELOW

CONCOURSE
BELOW

CONCOURSE
BELOW

POTENTIAL VENT SHAFT
LOCATION

DOWNTOWN EAST STATION

DN

CHAMBER
BUILDING

MAIN STATION
ENTRANCE

MAIN STATION ENTRANCE

SUN LIFE PLACE

DN

ALBERT

WORLD EXCHANGE
PLAZA

POSSIBLE SIDEWALK
WIDENING

POTENTIAL SECONDARY ENRANCE AT WORLD
EXCHANGE/ ALBERT - NOT IN PROJECT

PROPOSED SIDEWALK
WIDENING - NOT IN PROJECT

BELL CANADA

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN EAST
PLAN
GRADE LEVEL
DOTT-005-A100

| Scale: | Revision: | Sheet: |
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Plot Date: December 7, 2009

Last Saved: December 7, 2009

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SPARKS

BANK

203-209 QUEEN

CBC BUILDING

DOWNTOWN EAST STATION

HERITAGE PLACE

QUEEN

O'CONNOR

131 QUEEN

POTENTIAL VENT SHAFT LOCATION

ELEVATOR TO HERITAGE PLACE ABOVE

STAIRS TO ENTRANCE ABOVE

OPEN TO PLATFORM BELOW

UP

DN

DN

POTENTIAL VENT SHAFT LOCATION

CHAMBER BUILDING

STAIRS TO PLATFORM BELOW

ELEVATOR TO PLATFORM LEVEL BELOW

STAIRS TO PLATFORM BELOW

OUTLINE OF ENTRANCE ABOVE

SUN LIFE PLACE

UP

STAIRS TO MAIN STATION ENTRANCE ABOVE

ELEVATORS TO MAIN STATION ENTRANCE ABOVE

ALBERT

OUTLINE OF ENTRANCE ABOVE

WORLD EXCHANGE PLAZA

BELL CANADA

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN EAST
PLAN
CONCOURSE LEVEL
DOTT-005-A002

Scale: 1:500 | Revision: 00 | Sheet:

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Last Saved: December 7, 2009
Plot Date: December 7, 2009

SPARKS

BANK

203-209 QUEEN

CBC BUILDING

HERITAGE PLACE

QUEEN

CONNOR

POTENTIAL VENT SHAFT LOCATION

131 QUEEN

DOWNTOWN EAST STATION

BUILDING SERVICES

OUTLINE OF ENTRANCE ABOVE

UP

UP

CHAMBER BUILDING

POTENTIAL VENT SHAFT LOCATION

ESCALATOR UP TO CONCOURSE

ELEVATOR UP TO CONCOURSE

SUN LIFE PLACE

ELEVATOR UP TO CONCOURSE

ESCALATOR UP TO CONCOURSE

BUILDING SERVICES

POTENTIAL VENT SHAFT LOCATION

180 M

OUTLINE OF ENTRANCE ABOVE

ALBERT

WORLD EXCHANGE PLAZA

BELL CANADA

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
DOWNTOWN EAST
PLAN
PLATFORM LEVEL
DOTT-005-A003

| Scale: | Revision: | Sheet: |
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FAIRMONT CHATEAU LAURIER

MACKENZIE

WELLINGTON

RIDEAU STATION

THE BAY

STATION OUTLINE BELOW

OUTLINE OF FUTURE CONCOURSE (BY OTHERS)

DN

CONCPTUAL ACCESS TO THE BAY (CONFIGURATION TO BE DETERMINED)

RIDEAU

POSSIBLE STATION ENTRY

DN

ELEVATORS DOWN TO CONCOURSE

OUTLINE OF CONCOURSE BELOW

RIDEAU CANAL

GOVERNMENT OF CANADA CONFERENCE CENTRE

ELEVATORS DOWN TO CONCOURSE

DN

CONCEPTUAL ACCESS TO RIDEAU CENTRE (CONFIGURATION TO BE DETERMINED)

VENT SHAFT

ELEVATORS DOWN TO CONCOURSE

DN

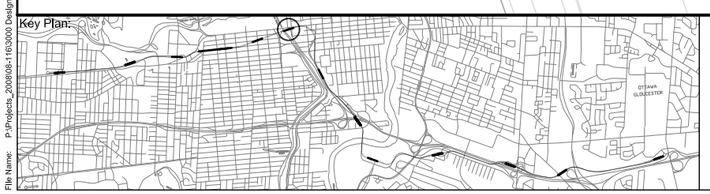
STATION ENTRANCE

VENT SHAFT

RIDEAU CENTRE

NATIONAL ARTS CENTRE

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
RIDEAU STATION
PLAN
GRADE LEVEL
DOTT-006-A100

Scale: 1:500
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Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: P:\Projects_2008\08-1163\3000 Design Documents\3300 Drawings\3350 Drawings\06 - Rideau\ACAD\DOTT-006-A100-00.dwg

FAIRMONT CHATEAU LAURIER

MACKENZIE

WELLINGTON

THE BAY

RIDEAU STATION

OUTLINE OF FUTURE CONCOURSE (BY OTHERS)

CONCPTUAL ACCESS TO THE BAY (CONFIGURATION TO BE DETERMINED)

ELEVATORS DOWN TO PLATFORM

ELEVATORS DOWN TO PLATFORM

UP

DN

DN

PLATFORM BELOW

UP

DN

UP

RIDEAU

ELEVATORS DOWN TO PLATFORM

ELEVATORS UP TO GRADE

CONCEPTUAL ACCESS TO RIDEAU CENTRE (CONFIGURATION TO BE DETERMINED)

VENT SHAFT

UP

ELEVATORS UP TO CONFEDERATION SQUARE

VENT SHAFT

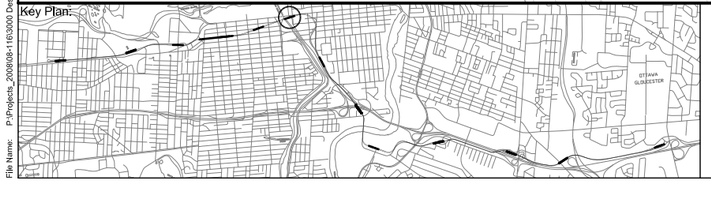
RIDEAU CANAL

GOVERNMENT OF CANADA CONFERENCE CENTRE

RIDEAU CENTRE

NATIONAL ARTS CENTRE

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
RIDEAU STATION
PLAN
CONCOURSE LEVEL
DOTT-006-A001

| Scale: | Revision: | Sheet: |
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Last Saved: December 7, 2009
Plot Date: December 7, 2009

FAIRMONT CHATEAU LAURIER

MACKENZIE

WELLINGTON

THE BAY

RIDEAU STATION

BUILDING SERVICES

ELEVATORS UP TO CONCOURSE

ELEVATORS UP TO CONCOURSE

OUTLINE OF FUTURE CONCOURSE ABOVE (BY OTHERS)

ELEVATORS UP TO CONCOURSE

OUTLINE OF CONCOURSE ABOVE

CONCPTUAL ACCESS TO THE BAY (CONFIGURATION TO BE DETERMINED)

UP

UP

PLATFORM

UP

RIDEAU

180 M

OUTLINE OF CONCOURSE ABOVE

GOVERNMENT OF CANADA CONFERENCE CENTRE

RIDEAU CANAL

CONCEPTUAL ACCESS TO RIDEAU CENTRE (CONFIGURATION TO BE DETERMINED)

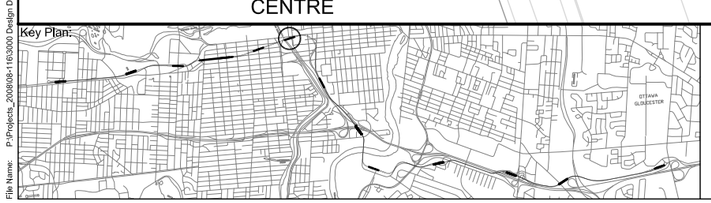
VENT SHAFT

VENT SHAFT

RIDEAU CENTRE

NATIONAL ARTS CENTRE

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
RIDEAU STATION
PLAN
PLATFORM LEVEL
DOTT-006-A002

| Scale: | Revision: | Sheet: |
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Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1163\3000 Design Documents\3300 Drawings\3350 Drawings\06 - Rideau\ACAD\DOTT-006-A002-00.dwg

UNIVERSITY CENTRE

JEAN J.LUSSIER

D'IORIO BUILDING

GENDRON BUILDING

CAVALLE

RESIDENCE

RESIDENCE

RESIDENCE

RESIDENCE

120 UNIVERSITE

VANIER BUILDING

CAREG BUILDING

MARION BUILDING

VENT SHAFT

STATION ENTRY AT GRADE

DN

CAMPUS STATION

ROOF OF STATION ENTRY AT UNDERPASS

VENT SHAFT

NICHOLAS

CONCOURSE BELOW

PEDESTRIAN TUNNEL BELOW

CONCOURSE BELOW

OUTLINE OF STATION BELOW

COLONEL BY

CORKTOWN BRIDGE

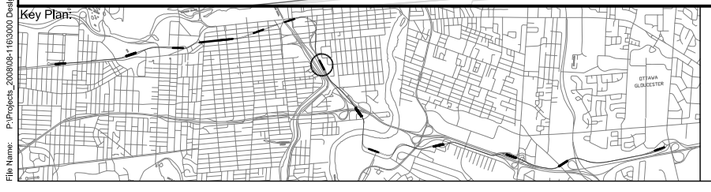
RIDEAU CANAL

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1163\000 Design Documents\3300 Drawings\3350 Drawings\07 - Campus\ACAD\DOTT-007-A100-00.dwg

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
CAMPUS STATION
PLAN
GRADE LEVEL
DOTT-007-A100

| Scale: | Revision: | Sheet: |
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| 1:500 | 00 | |

UNIVERSITY CENTRE

JEAN J.LUSSIER

D'IORIO BUILDING

GENDRON BUILDING

VANIER BUILDING

CAREG BUILDING

CAVALLE

RESIDENCE

RESIDENCE

RESIDENCE

RESIDENCE

120 UNIVERSITE

MARION BUILDING

ELEVATORS DOWN TO CONCOURSE

VENT SHAFT

NICHOLAS

STATION ENTRY ABOVE

UP DN

CONCOURSE BELOW

CAMPUS STATION

DN

STATION ENTRY AT PEDESTRIAN UNDERPASS

CONCOURSE BELOW

VENT SHAFT

EXISTING PEDESTRIAN UNDERPASS

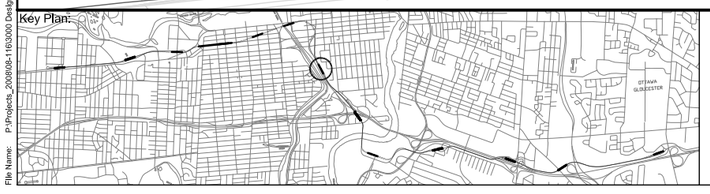
COLONEL BY

OUTLINE OF STATION BELOW

CORKTOWN BRIDGE

RIDEAU CANAL

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
CAMPUS STATION
PLAN
UNDERPASS LEVEL
DOTT-007-A001

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

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Last Saved: December 7, 2009
Plot Date: December 7, 2009

UNIVERSITY CENTRE

JEAN J.LUSSIER

D'IORIO BUILDING

GENDRON BUILDING

VANIER BUILDING

CAREG BUILDING

MARION BUILDING

CAVALLE

RESIDENCE

RESIDENCE

RESIDENCE

RESIDENCE

120 UNIVERSITE

PEDESTRIAN UNDEPASS ABOVE

OUTLINE OF STATION ENTRANCE ABOVE

CAMPUS STATION

VENT SHAFT

UP

NICHOLAS

OUTLINE OF STATION ENTRANCE ABOVE

CONCOURSE

ELEVATORS UP TO STATION ENTRANCE

CONCOURSE

VENT SHAFT

DN

DN

COLONEL BY

ELEVATORS DOWN TO PLATFORM

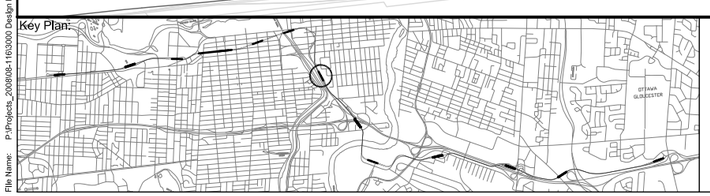
ELEVATORS DOWN TO PLATFORM

OUTLINE OF STATION BELOW

CORKTOWN BRIDGE

RIDEAU CANAL

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL

0m 20 40 80 120 160

0m 4 8 16 24 32

VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:

CAMPUS STATION
PLAN
CONCOURSE LEVEL
DOTT-007-A002

| Scale: | Revision: | Sheet: |
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Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1160\3000 Design Documents\3300 Drawings\3350 Drawings\07 - Campus\ACAD\DOTT-007-A002-00.dwg

UNIVERSITY CENTRE

JEAN J.LUSSIER

D'IORIO BUILDING

GENDRON BUILDING

VANIER BUILDING

CAREG BUILDING

CAVALLE

RESIDENCE

RESIDENCE

RESIDENCE

RESIDENCE

120 UNIVERSITE

MARION BUILDING

OUTLINE OF PEDESTRIAN TUNNEL ABOVE

OUTLINE OF STATION ENTRANCE ABOVE

VENT SHAFT

NICHOLAS

BUILDING SERVICES

OUTLINE OF CONCOURSE ABOVE

CAMPUS STATION

OUTLINE OF CONCOURSE ABOVE

VENT SHAFT

BUILDING SERVICES

UP

UP

PLATFORM

COLONEL BY

ELEVATORS UP TO CONCOURSE

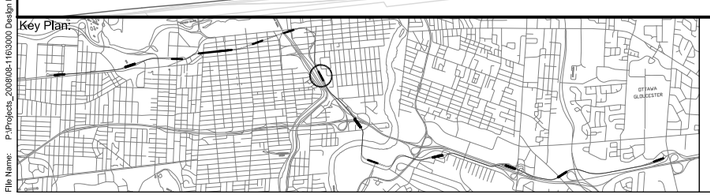
ELEVATORS UP TO CONCOURSE

180 M

CORKTOWN BRIDGE

RIDEAU CANAL

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL

0m 20 40 80 120 160

0m 4 8 16 24 32

VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:

CAMPUS STATION
PLAN
PLATFORM LEVEL
DOTT-007-A003

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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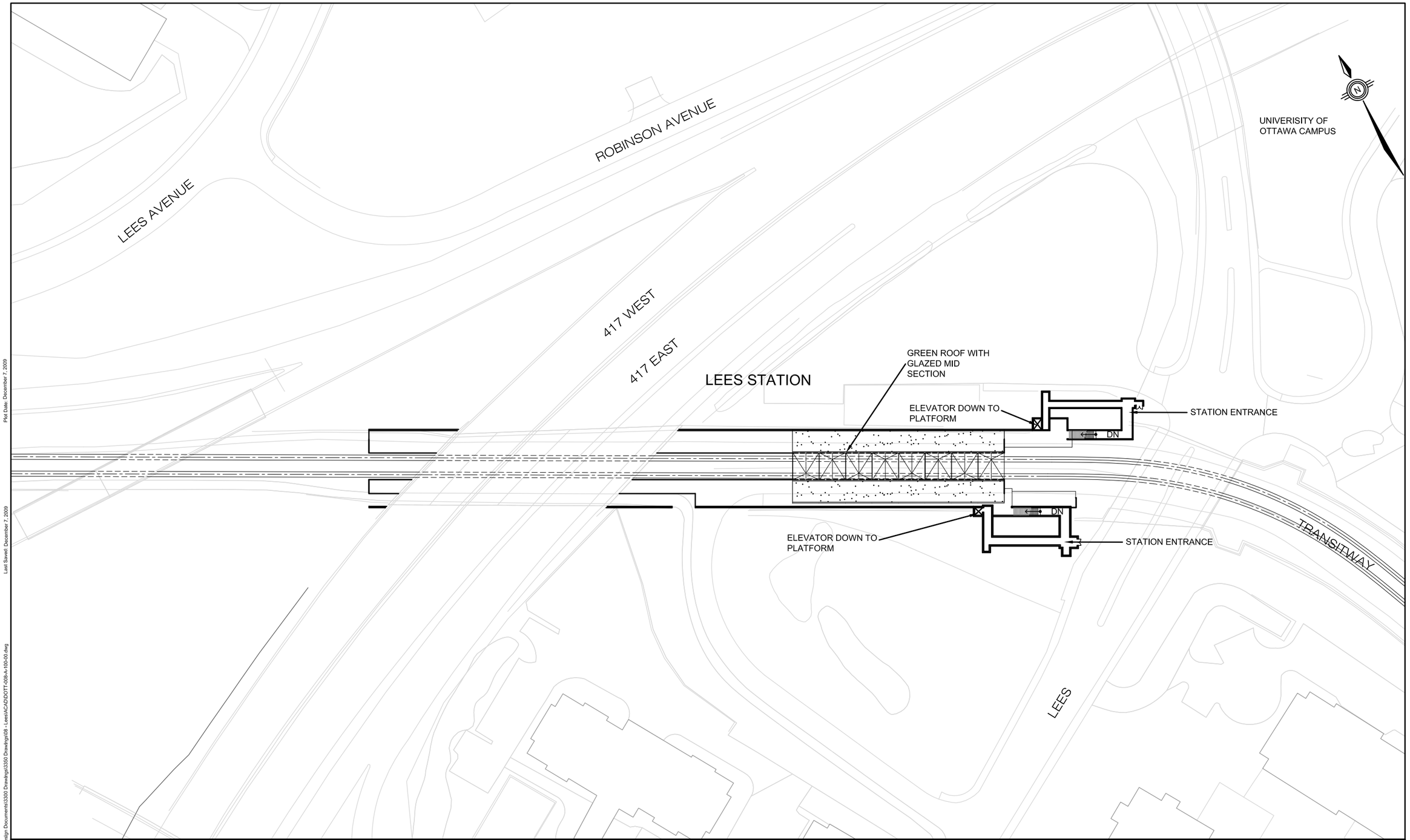


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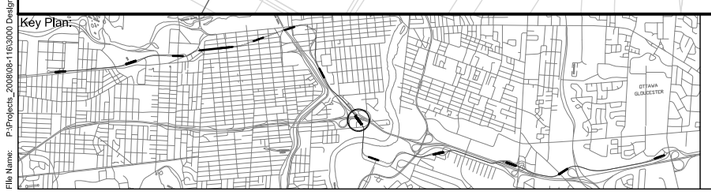

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
LEES AVENUE
PLAN
GRADE LEVEL
DOTT-008-A100

| Scale: | Revision: | Sheet: |
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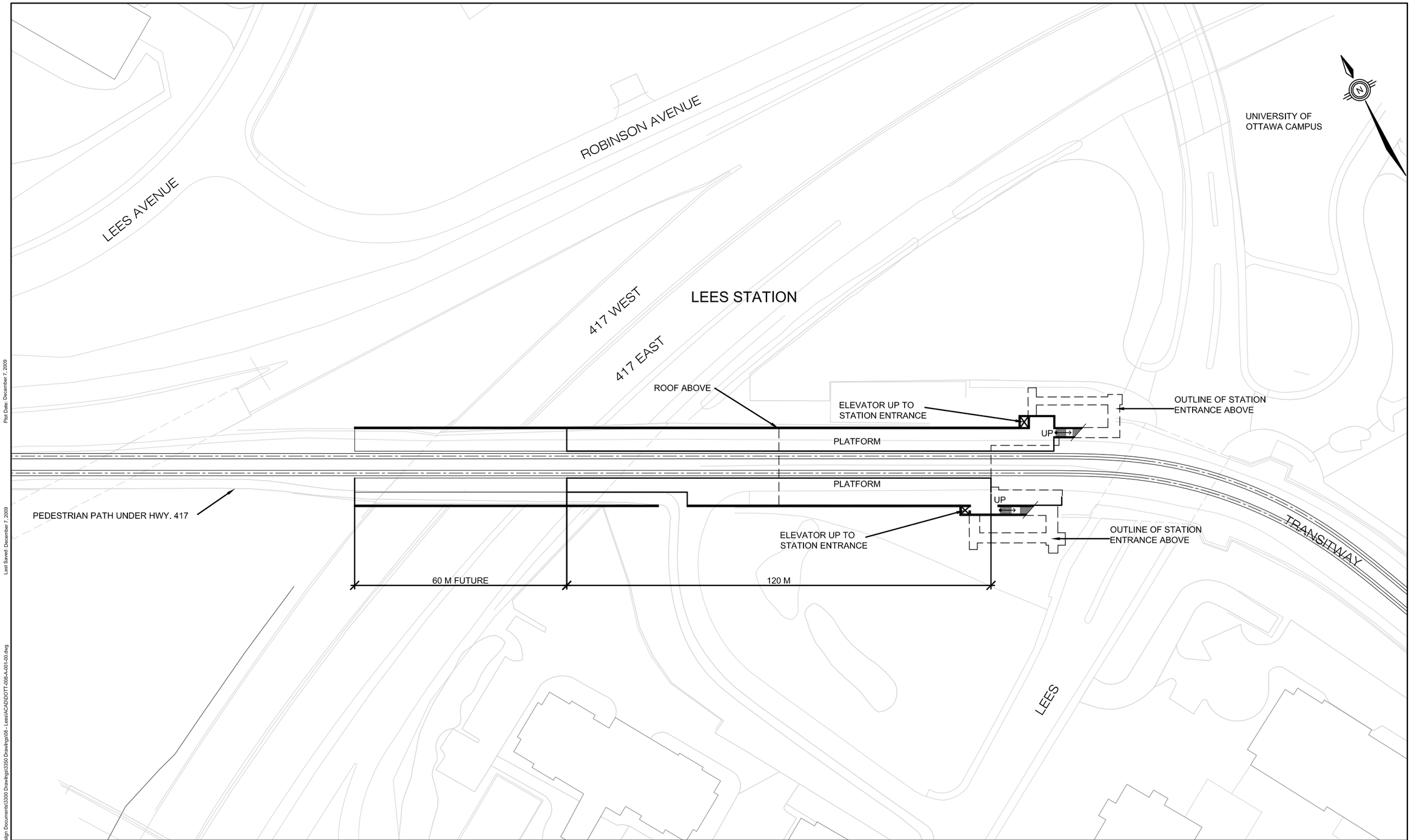
Plot Date: December 7, 2009

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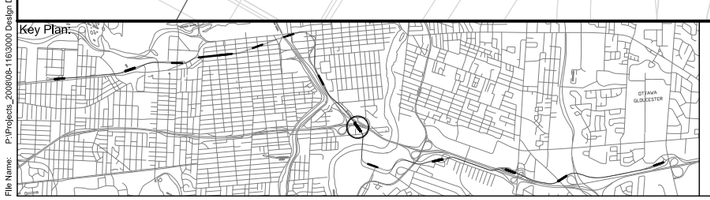

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
LEES STATION
PLAN
PLATFORM LEVEL
DOTT-008-A001

| Scale: | Revision: | Sheet: |
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| 1:500 | 00 | |

Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: P:\Projects_2008\08-166\3000 Design Documents\3300 Drawings\3350 Drawings\08 - Lees\ACAD\DOTT-008-A-001-00.dwg

# HURDMAN STATION

RAMP DOWN UNDER LRT PLATFORM

PEDESTRIAN ACCESS TO RECREATION PATHS AND FUTURE DEVELOPMENT

ELEVATOR UP TO LRT PLATFORM

EXTENT OF EMBANKMENT

LINE OF RAILBED ABOVE

LRT PLATFORM ABOVE

RAMP DOWN UNDER LRT PLATFORM

PEDESTRIAN ACCESS TO RECREATION PATHS AND FUTURE DEVELOPMENT

ELEVATOR UP TO LRT PLATFORM

DN

UP

DN

UP

DN

DN

DN

DN

EXTENT OF EMBANKMENT

STAIRS AND RAMP DOWN UNDER LRT PLATFORM

BRT PLATFORM

STAIRS AND RAMP DOWN UNDER LRT PLATFORM

RETAINING WALL

TRANSITWAY

TRANSITWAY

TRANSITWAY

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
HURDMAN
PLAN
GRADE LEVEL BRT PLATFORM
DOTT-009-A100

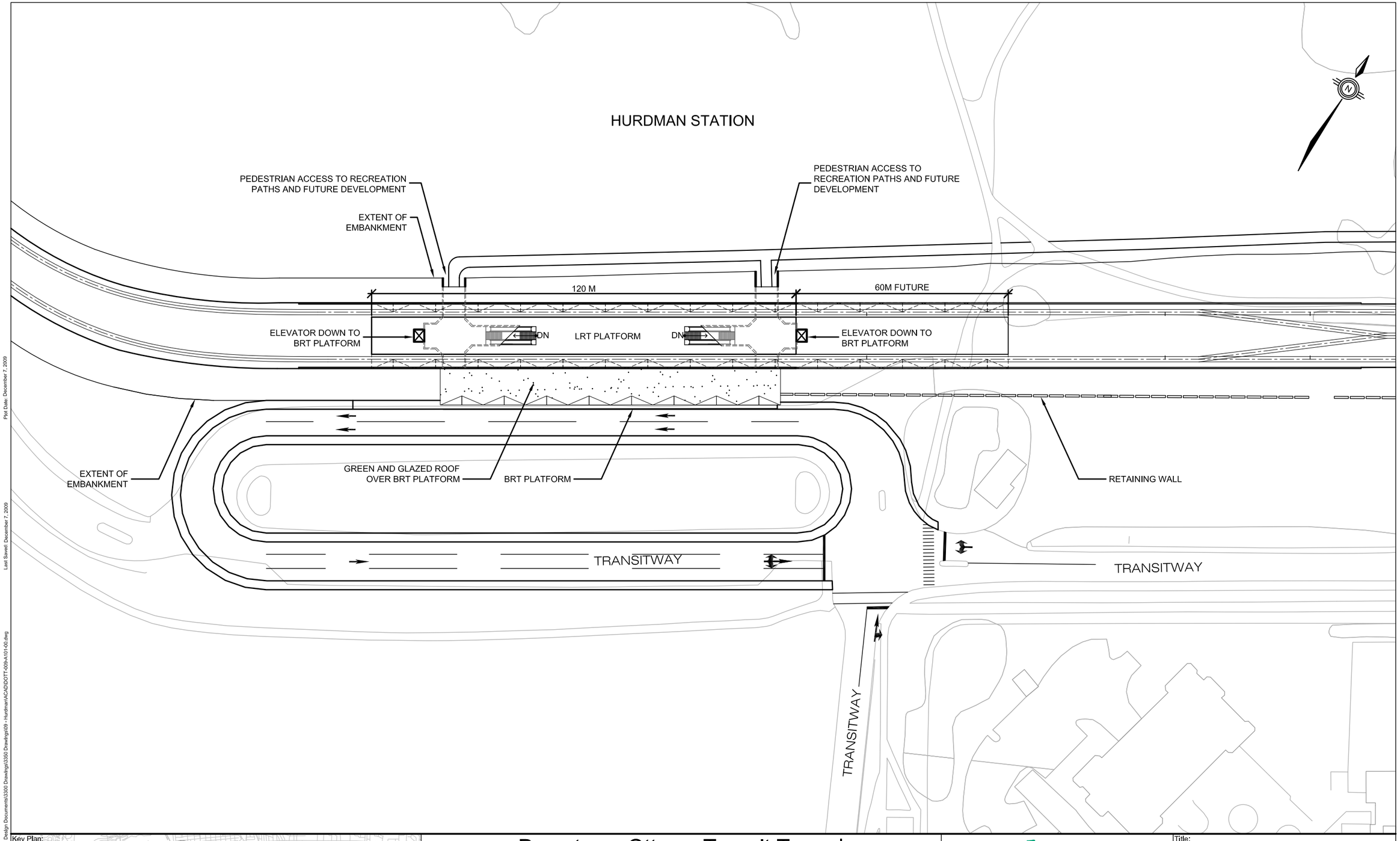
| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1183\3000 Design Documents\3300 Drawings\3350 Drawings\09 - Hurdman\ACAD\DOTT-009-A100-00.dwg

# HURDMAN STATION

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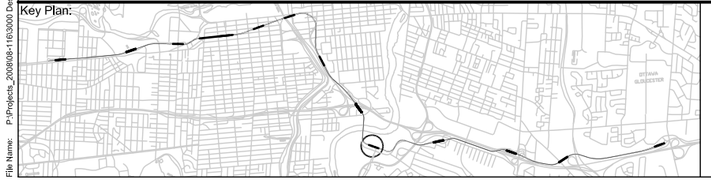

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan MRC McCORMICK RANKIN CORPORATION

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
HURDMAN
PLAN
PLATFORM LEVEL
DOTT-009-A101

| Scale: | Revision: | Sheet: |
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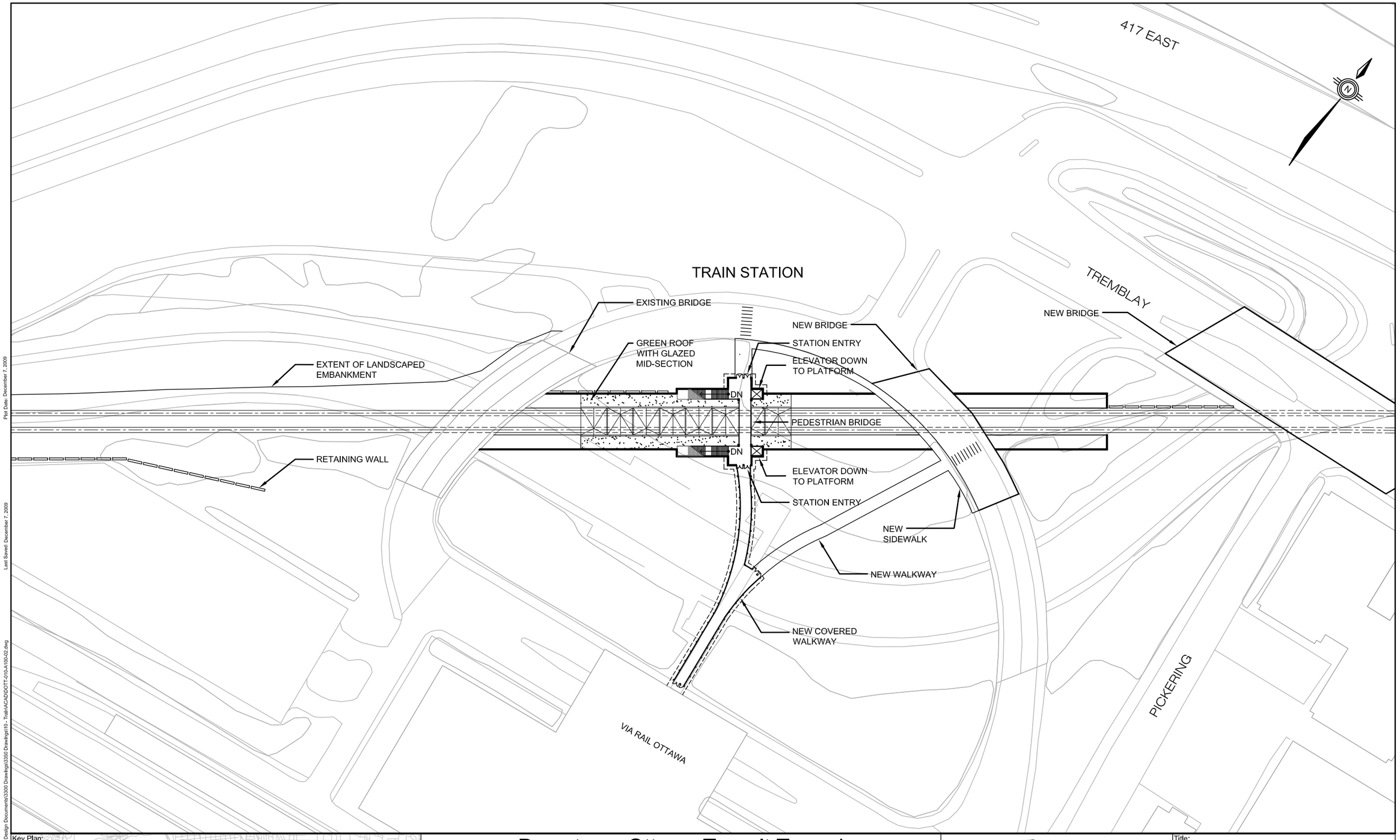
Plot Date: December 7, 2009




Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
TRAIN
PLAN
GRADE LEVEL
DOTT-010-A100

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

File Name: P:\Projects_2008\08-1163\3000 Design Documents\3300 Drawings\3350 Drawings\10 - Trailn\ACAD\DOTT-010-A100-02.dwg
Last Saved: December 7, 2009
Plot Date: December 7, 2009

417 EAST

TRAIN STATION

TREMBLAY

NEW BRIDGE

STATION ENTRY ABOVE

EXISTING BRIDGE

RETAINING WALL

ELEVATOR UP TO ENTRY LEVEL

EXTENT OF LANDSCAPED EMBANKMENT

NEW BRIDGE

RETAINING WALL

UP

PAID AREA

PEDESTRIAN BRIDGE ABOVE

PAID AREA

UP

RETAINING WALL

ELEVATOR UP TO ENTRY LEVEL

STATION ENTRY ABOVE

120 M

60 M FUTURE

PROPOSED PEDESTRIAN PATHWAY ABOVE

VIA RAIL OTTAWA

PICKERING

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
TRAIN
PLAN
PLATFORM LEVEL
DOTT-010-A001

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: P:\Projects_2008\08-116\3000 Design Documents\3300 Drawings\3350 Drawings\10 - Train\ACAD\DOTT-010-A001-02.dwg

ST. LAURENT
SHOPPING
CENTRE

ST. LAURENT STATION

LABELLE STREET

ST. LAURENT BLVD.

TRANSITWAY

417 ON-RAMP

TRANSITWAY

REFURBISHED ELEVATOR
DOWN TO PLATFORM

EXISTING TRANSIT
INFO CENTRE

EXISTING BUS
TRANSIT PLATFORM

DN DN
DN DN

STATION BELOW

REFURBISHED ELEVATOR
DOWN TO PLATFORM

417 ON-RAMP

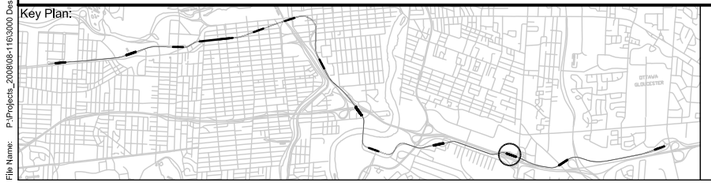
417 WEST

417 EAST

417 ON-RAMP

417 OFF-RAMP

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
ST. LAURENT
PLAN
GRADE LEVEL
DOTT-011-A100

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-116\3000 Design Documents\3300 Drawings\3350 Drawings\11 - St Laurent\ACAD\DOTT-011-A100-00.dwg

ST. LAURENT SHOPPING CENTRE

ST. LAURENT STATION

ACCESS TO SHOPPING CENTRE

ELEVATOR UP TO STATION ENTRANCE / DOWN TO PLATFORM

DN DN DN DN

ELEVATOR UP TO STATION ENTRANCE / DOWN TO PLATFORM

LABELLE STREET

ST. LAURENT BLVD.

TRANSITWAY

417 ON-RAMP

TRANSITWAY

417 ON-RAMP

417 WEST

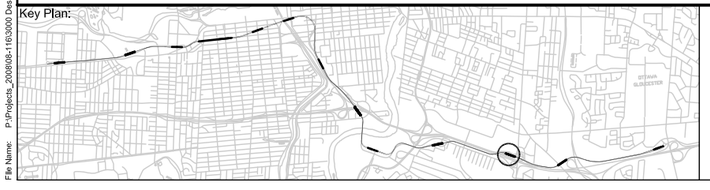
417 EAST

417 ON-RAMP

417 OFF-RAMP

N

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
ST. LAURENT
PLAN
BRIDGE LEVEL
DOTT-011-A001

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

File Name: P:\Projects_2008\08-1161\3000 Design Documents\3300 Drawings\3350 Drawings\11 - St Laurent\ACAD\DOTT-011-A001-00.dwg
Last Saved: December 7, 2009
Plot Date: December 7, 2009

ST. LAURENT
SHOPPING
CENTRE

ST. LAURENT STATION

ACCESS TO SHOPPING
CENTRE ABOVE

ELEVATOR UP TO
STATION ENTRANCE

UP

UP

BRIDGE ABOVE

UP

UP

120 M

60 M FUTURE

ELEVATOR UP TO
STATION ENTRANCE

417 ON-RAMP

LABELLE STREET

ST. LAURENT BLVD.

TRANSITWAY

417 ON-RAMP

TRANSITWAY

417 WEST

417 EAST

417 ON-RAMP

417 OFF-RAMP

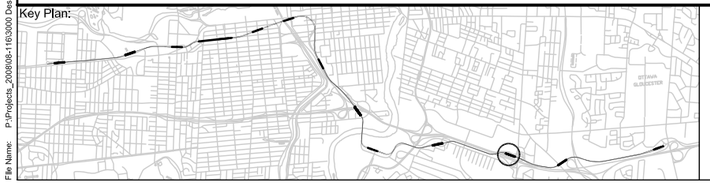
N

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1161\3000 Design Documents\3300 Drawings\3350 Drawings\11 - St Laurent\ACAD\DOTT-011-A002-00.dwg

Key Plan:




# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:

ST. LAURENT
PLAN
PLATFORM LEVEL
DOTT-011-A002

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

QUEENSWAY
CORPORATE
CAMPUS

CYRVILLE / OTTAWA ROAD 128

BEAUPARC PVT.

PLACE DES
GOUVERNEURS

CYRVILLE STATION

TRANSITWAY

ELEVATOR DOWN TO
PLATFORM

DN

ELEVATOR DOWN TO
PLATFORM

DN

GREEN ROOF WITH
GLAZED MIDDLE
SECTION

174 OFF RAMP

417 WEST

417 EAST

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
CYRVILLE
PLAN
GRADE LEVEL
DOTT-012-A100

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: P:\Projects_2008\08-1163\000 Design Documents\3300 Drawings\3350 Drawings\12 - Cyrville\ACAD\DOTT-012-A100-00.dwg

QUEENSWAY
CORPORATE
CAMPUS

CYRVILLE / OTTAWA ROAD 128

BEAUPARC PVT.

PLACE DES
GOUVERNEURS

CYRVILLE STATION

ELEVATOR UP TO
STATION ENTRANCE

120 M

60 M FUTURE

UP

UP

ROOF ABOVE

ELEVATOR UP TO
STATION ENTRANCE

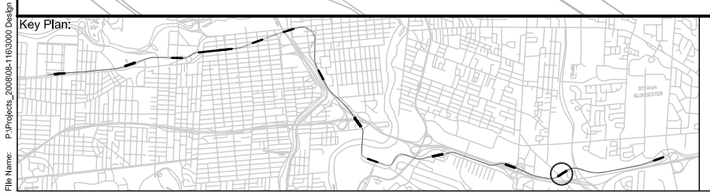
TRANSITWAY

174 OFF RAMP

417 WEST

417 EAST

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa Delcan

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
CYRVILLE
PLAN
PLATFORM LEVEL
DOTT-012-A001

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1163000 Design Documents\3300 Drawings\3350 Drawings\12 - Cyrville\ACAD\DOTT-012-A001-00.dwg

GLOUCESTER CENTRE

CITY PARK DRIVE

STAIR TOWER

BLAIR STATION

TRANSITWAY

TRANSITWAY

TRANSITWAY

DN

STATION ENTRANCE

DN

UP

STATION ENTRANCE

ELEVATOR DOWN TO PLATFORM

STAIR TOWER

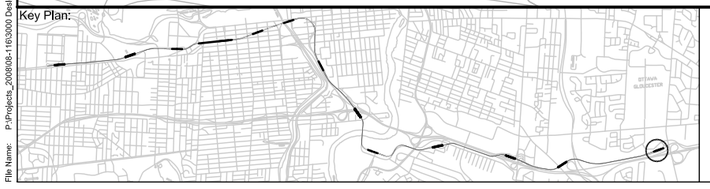
PEDESTRIAN BRIDGE ABOVE

PEDESTRIAN BRIDGE ABOVE TO REMAIN (UNCHANGED)

174 WEST

174 EAST

Key Plan:



# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BLAIR STATION
PLAN
BRT PLATFORM LEVEL
DOTT-013-A100

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-116\3000 Design Documents\3300 Drawings\13 - Blair\ACAD\DOTT-013-A100-00.dwg

GLOUCESTER CENTRE

CITY PARK DRIVE

BLAIR STATION

TRANSITWAY

STAIR TOWER

120 M

60 M FUTURE

UP

UP

STATION ENTRANCE ABOVE

ELEVATOR UP TO STATION ENTRANCE

EXISTING STAIR TOWER ABOVE

PEDESTRIAN BRIDGE ABOVE

PEDESTRIAN BRIDGE ABOVE TO REMAIN (UNCHANGED)

TRANSITWAY

174 WEST

174 EAST

Key Plan:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

grc architects / DAVID S McROBIE ARCHITECTS INC.
Architects in Joint Venture

Title:
BLAIR
PLAN
PLATFORM LEVEL
DOTT-013-A001

| Scale: | Revision: | Sheet: |
|---|---|---|
| 1:500 | 00 | |

Plot Date: December 7, 2009

Last Saved: December 7, 2009

File Name: P:\Projects_2008\08-1160\3000 Design Documents\3300 Drawings\3350 Drawings\13 - Blair\ACAD\DOTT-013-A001-00.dwg

# ANCILLARY FEATURES

Mann
Mann
Lees
Lees
Existing Asphalt Roadway to be Removed and Landscaped
Concrete Barrier Curb
104+100
104+200
Concrete Barrier Curb
Existing Concrete Island to be Removed
Double Swing Gate
Lees
104+300
104+400
Chainlink Fence
Access Stairs to Track Level
417 Ramp
Chainlink Fence
Transitway
Transitway
SC = 104+054.41
Nicholas
Nicholas
CS = 104+368.58
ST = 104+408.58
N
Robinson
104+600
104+661.39
TS = 104+661.39
SC = 104+
600mm Strm.
417
417
104+500
Lees Station
Lees
Exisitng Asphalt Sidewalk to be Removed and Landscaped
Concrete Sidewalk
Concrete Barrier Curb
Existing Asphalt Roadway to be Removed and Landscaped
Transitway
Transitway
N

Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 10 20 40 60 80

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .
Sheet: 3-1

Plot Date: December 7, 2009
Last Saved: December 7, 2009
File Name: H:\ISOT\30041\TOE\DWGS\01-plan\rlg\TO3041TOEW_SH_3-01.dwg

417
417
417
Chainlink Fence
Double Swing Gate
Asphalt Maintenance Strip to be Regraded
Asphalt Ramp to be Regraded
106+900
N
Transitway
Transitway
Transitway
Existing Asphalt Maintenace Strip to Remain
106+800
Ex. 1220mm Wm.
CS = 106+897.16
STF = 106+937.16
Area to be Landscaped
Concrete Barrier Curb
Ex. 1650mm Strm.
SC = 106+855.27
Tremblay
Tremblay
Tremblay
1050mm Strm.
106+700
600mm San.
Tremblay
Pickering
TS = 106+815.27
K
417
417 Ramp
525mm San.
St. Laurent
St. Laurent
108+100
Chainlink Fence
Double Swing Gate
Chainlink Fence
Concrete Barrier c/w Chainlink Fence
Lemieux
107+900
108+000
108+200
N
Transitway
Transitway
Ex. 1650mm Strm
St. Laurent Station
Transitway
Transitway
Exisitng Asphalt Maintenace Strip to Remain
TS = 108+237.62
Transitway
TS = 107+997.76
SC = 108+027.76
CS = 108+038.69
ST = 108+068.69
417 Ramp
417
417

Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL
0m 10 20 40 60 80

Section:

## Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 3-2

Plot Date: December 7, 2009
Last Saved: December 7, 2009
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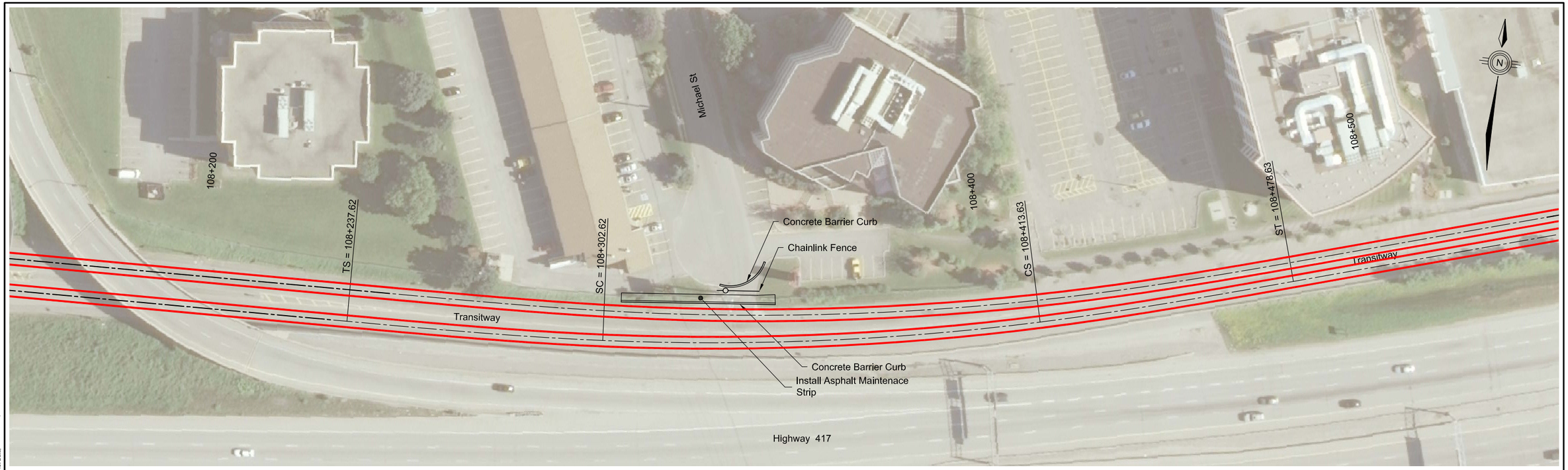


Plot Date: December 7, 2009

Last Saved: December 7, 2009

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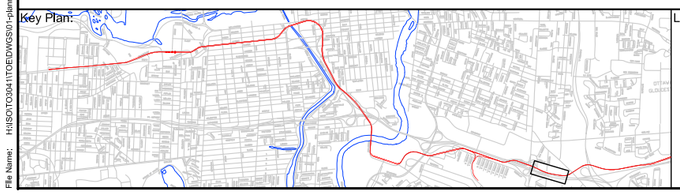
Key Plan:



Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL

0m 10 20 40 60 80

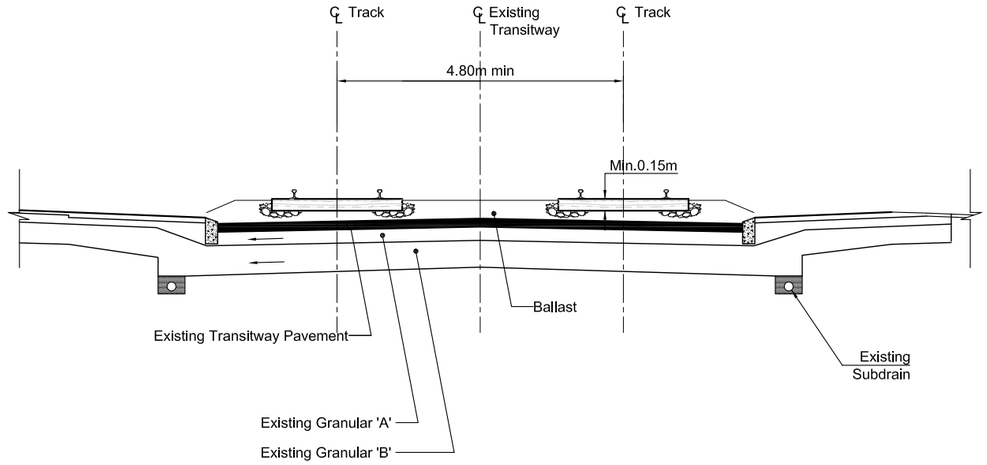
Section:

Section

Subtitle
Subtitle
Subtitle

Revision: .

Sheet: 3-3




Key Plan:

Legend:

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via a Downtown LRT Tunnel

HORIZONTAL 0m 1 2 4 6 8

VERTICAL 0m 1 2 4 6 8

Section:

## Typical Transitway Conversion Section

Revision: .

Sheet: 3-4

Plot Date: December 7, 2009

Last Saved: December 7, 2009

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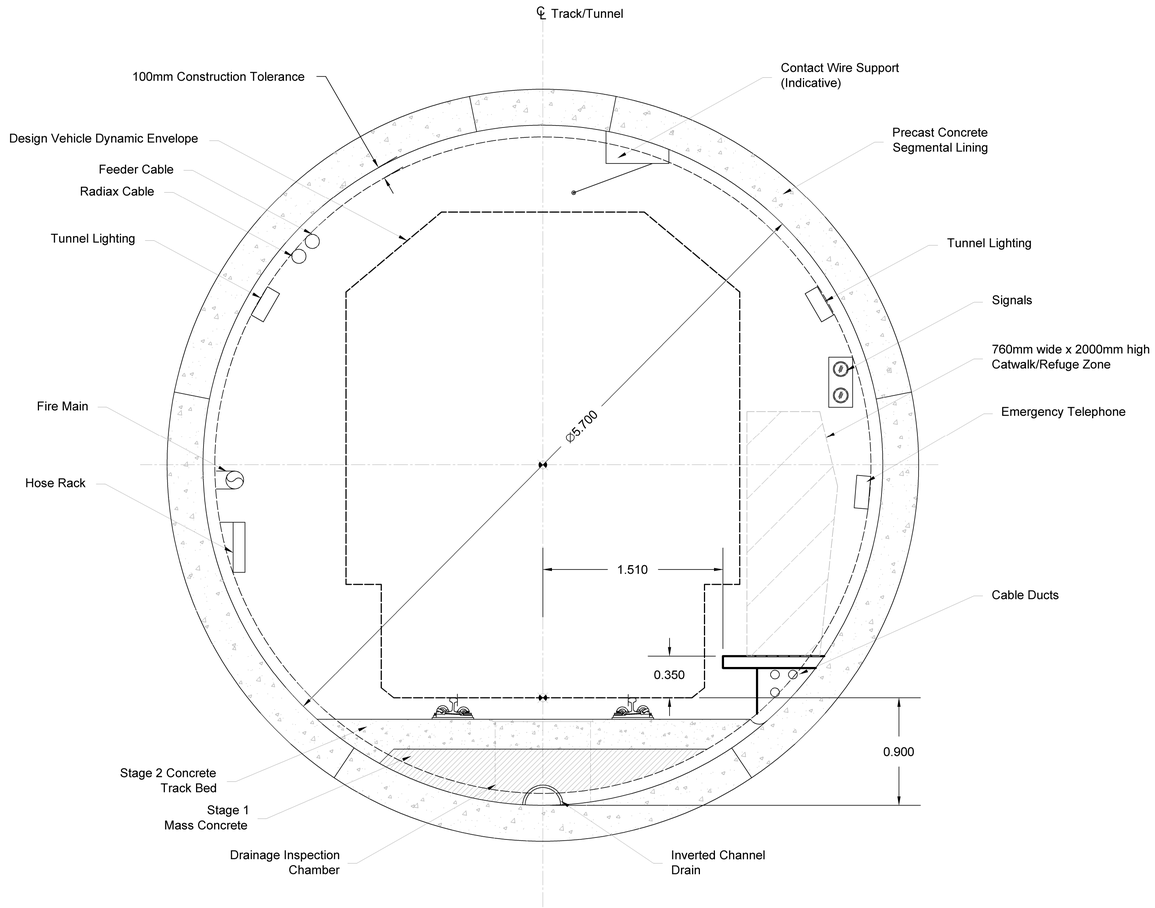
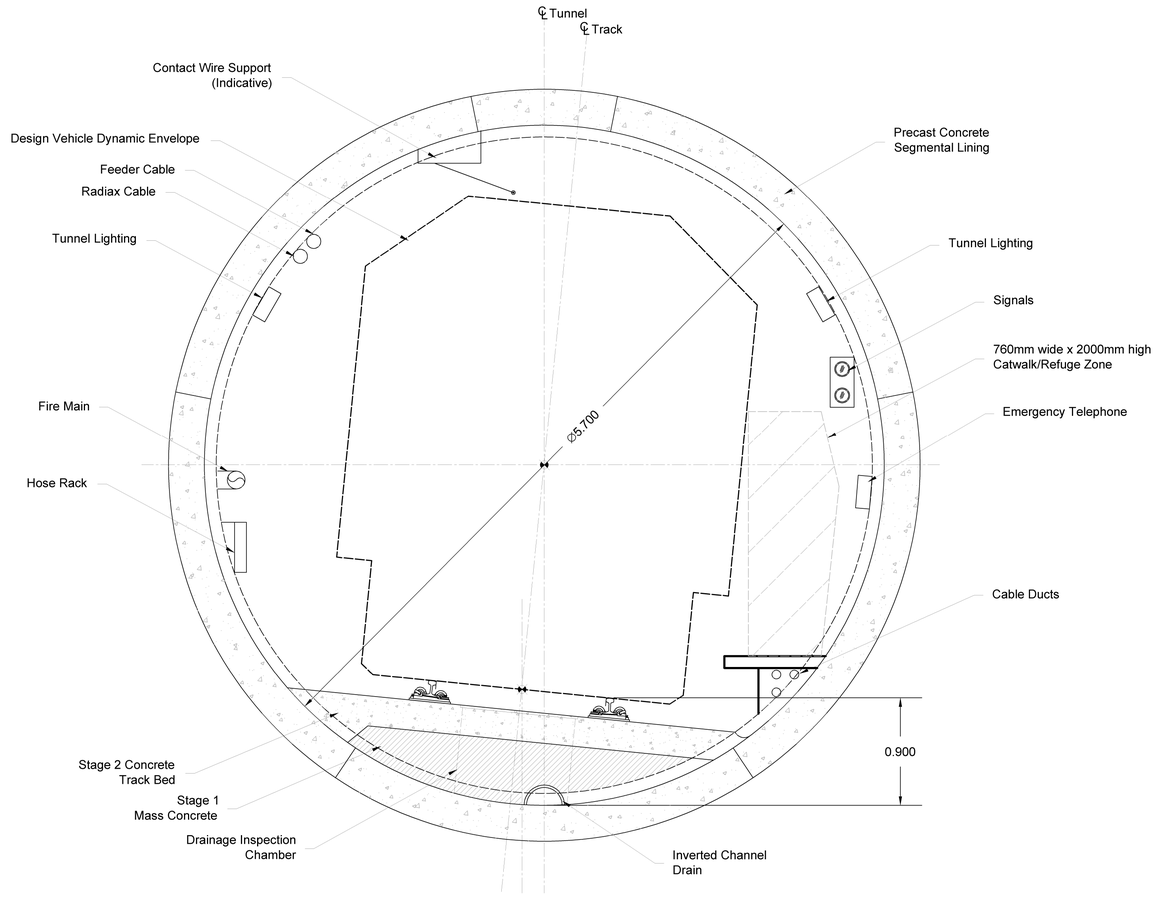



Tangent Track
Scale 1:25




Max Superelevation
Scale 1:25

Key Plan:

DRAFT FOR DISCUSSION

Notes:

1. The information shown on this drawing is preliminary, for outline planning purposes only. The tunnels, stations and shaft details and outlines are subject to further geotechnical and other infrastructure investigations and to ongoing railway alignment development.
2. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
3. All dimensions are in metres unless shown otherwise.
4. All information shown is indicative of the structural requirements. Actual structural and detail arrangements remain to be confirmed and are subject to future investigations, assessments and design.

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair via a Downtown LRT Tunnel

0m 1 2 3 4
Scale 1:50 @ ANSI B
Scale 1:25 @ ANSI D

Ottawa
Delcan
Halcrow

Section:
## Typical Cross Sections Bored Tunnels

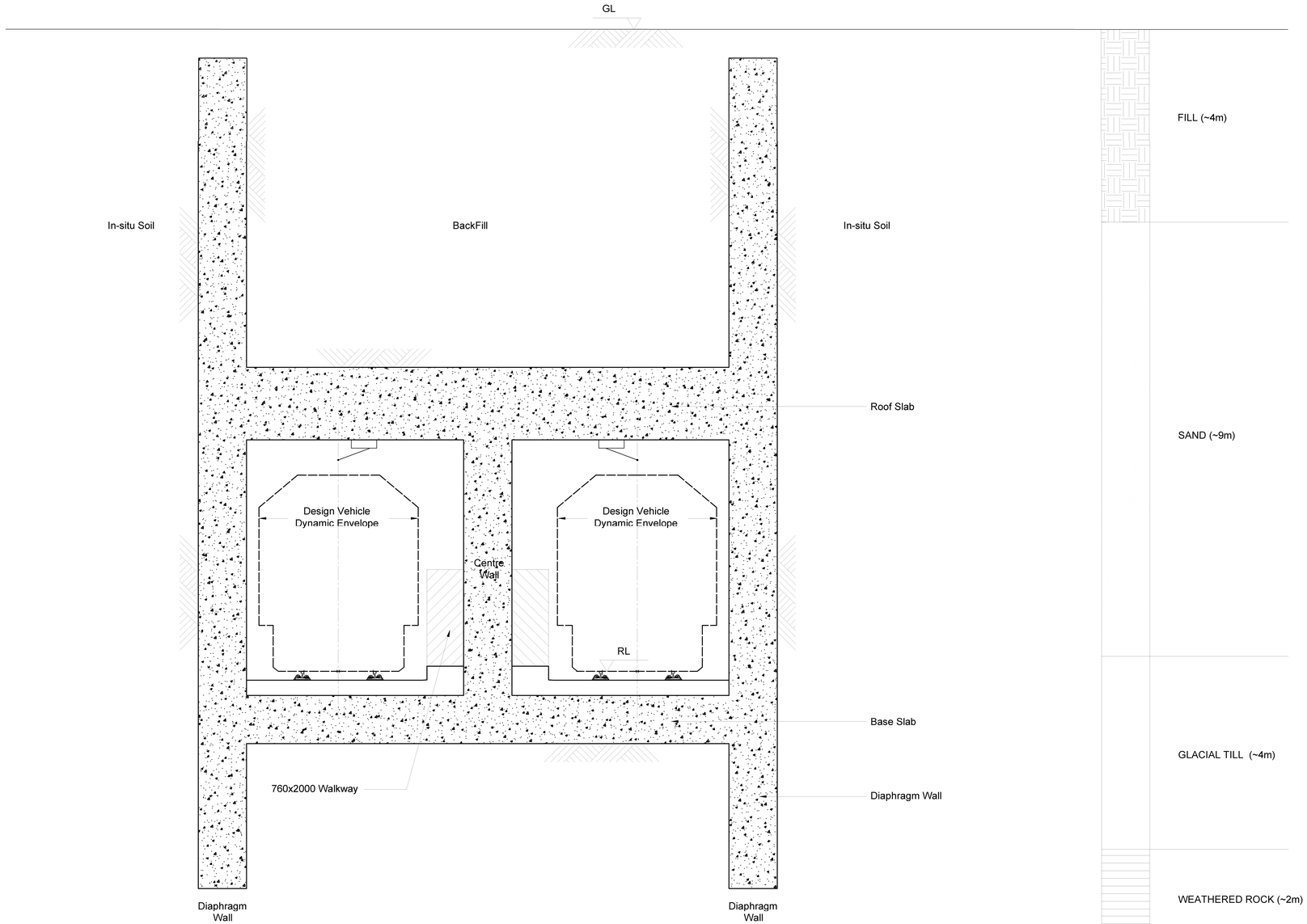
TTDOTT-HGL-00-XX-DR-01101

Revision: 02

Sheet: 1-1

| Rev | By | Chkd | Aprvd | Date | Description |
|---|---|---|---|---|---|
| 02 | JR | AE | JMB | 03/12/09 | Platform Lowered |
| 01 | JR | AE | JMB | 16/10/09 | First Issue |

Plot Date: December 7, 2009
Last Saved: December 3, 2009
File Name: C:\documents And Settings\dravelmalpw_dotfdms\00993\TTDOTT-HGL-00-XX-DR-C-01101-02.01.dwg




Cross Section
104+100
Scale 1:50

Key Plan:

Notes:
1. The information shown on this drawing is preliminary, for outline planning purposes only. The tunnels, stations and shaft details and outlines are subject to further geotechnical and other infrastructure investigations and to ongoing railway alignment development.
2. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
3. All dimensions are in metres unless shown otherwise.
4. Rail level shown is taken from Profile June 2009

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair via a Downtown LRT Tunnel

0m 1 2 4 6 8
Scale 1:50 @ ANSI D

Ottawa
Delcan
Halcrow

Section: Typical Cut & Cover Tunnel

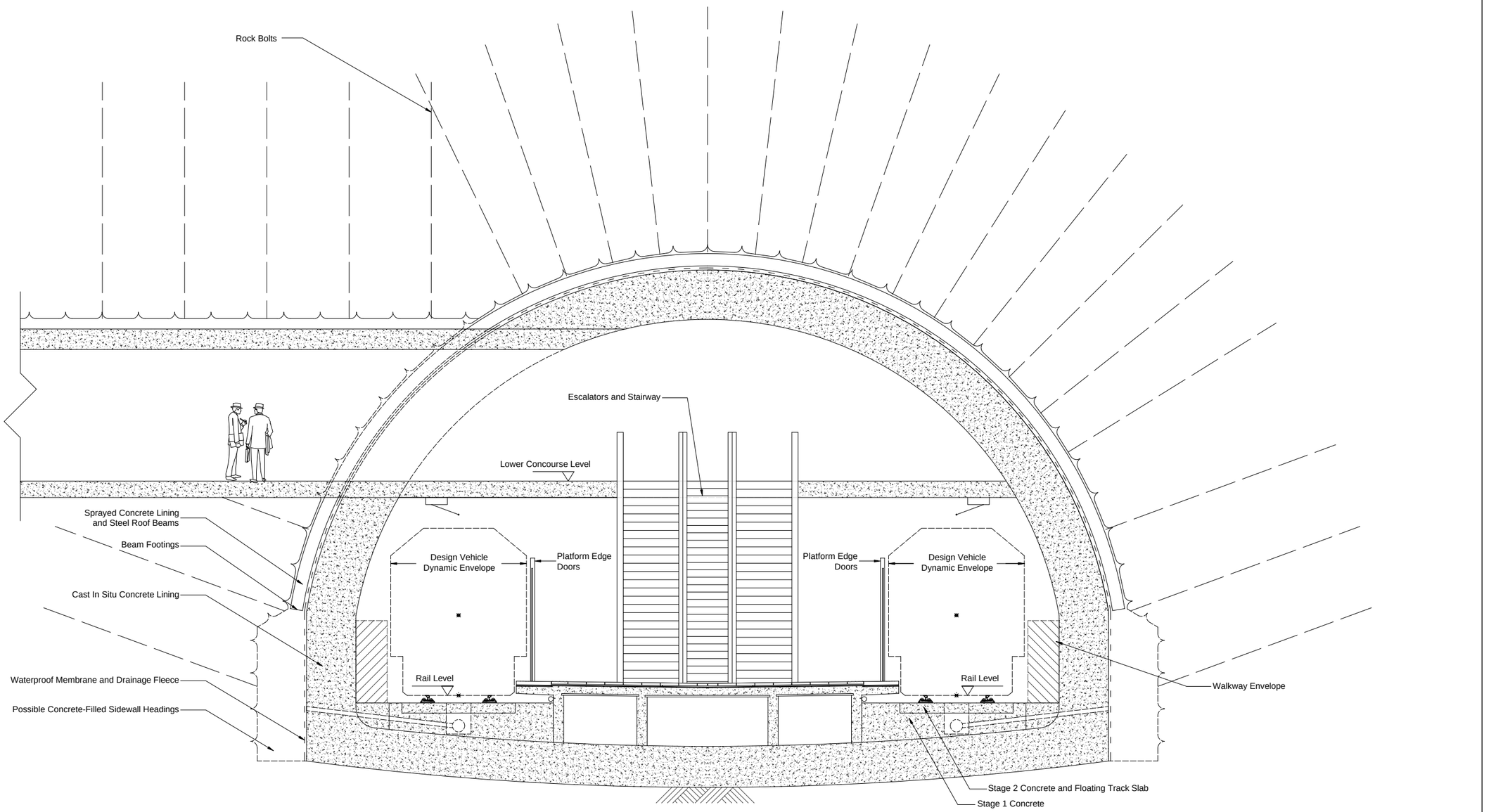
TTDOTT-HGL-00-XX-DR-01722

Revision: 02

Sheet: 1-1

| Rev | By | Chkd | Aprvd | Date | Description |
|---|---|---|---|---|---|
| 02 | JR | AE | JMB | 03/12/09 | Dimensions Removed |
| 01 | JR | AE | JMB | 16/10/09 | First Issue |

Plot Date: December 7, 2009
Last Saved: December 3, 2009
File Name: C:\documents And Settings\dsteinar\pw_dot\dms00909\TTDOTT-HGL-00-XX-DR-C-01722-02.01.dwg




Key Plan:

Notes:

1. The information shown on this drawing is preliminary, for outline planning purposes only. The tunnels, stations and shaft details and outlines are subject to further geotechnical and other infrastructure investigations and to ongoing railway alignment development.
2. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
3. All dimensions are in metres unless shown otherwise.
4. All information shown is indicative of the outline structural requirements for a cavern type station. Details remain to be confirmed and are subject to future investigations, assessments, analysis and design.

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair via a Downtown LRT Tunnel

0m 1 2 4 6 8

Scale 1:50 @ ANSI D

Ottawa
Delcan
Halcrow

Section:

## Typical Cross Section of Station Cavern

TTDOTT-HGL-00-XX-DR-C-01111

Revision: 01

Sheet: 1-1

| Rev | By | Chkd | Aprvd | Date | Description |
|---|---|---|---|---|---|
| 01 | JR | JMB | JMB | 04/12/09 | First Issue |

Plot Date: December 4, 2009

Last Saved: December 4, 2009

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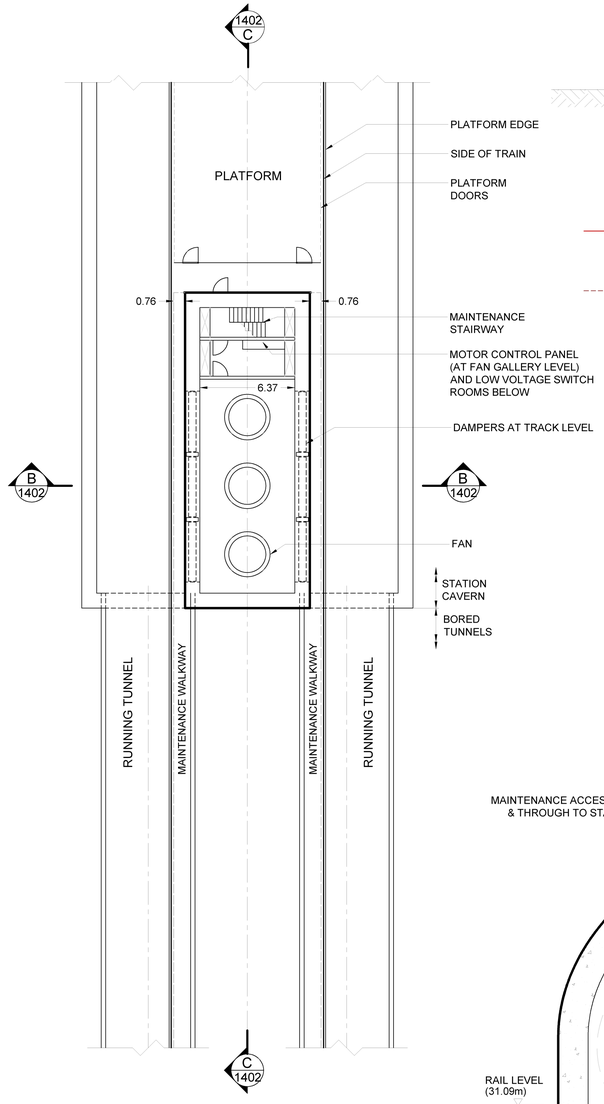
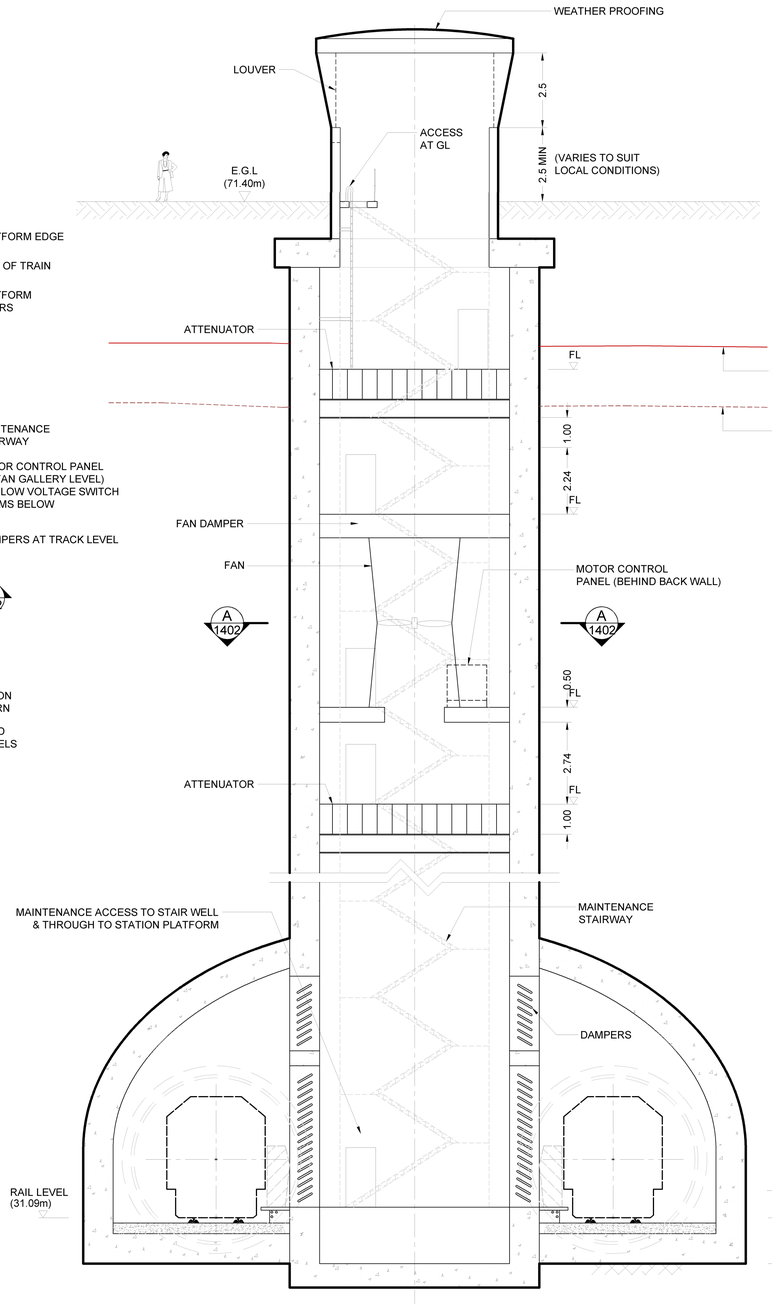


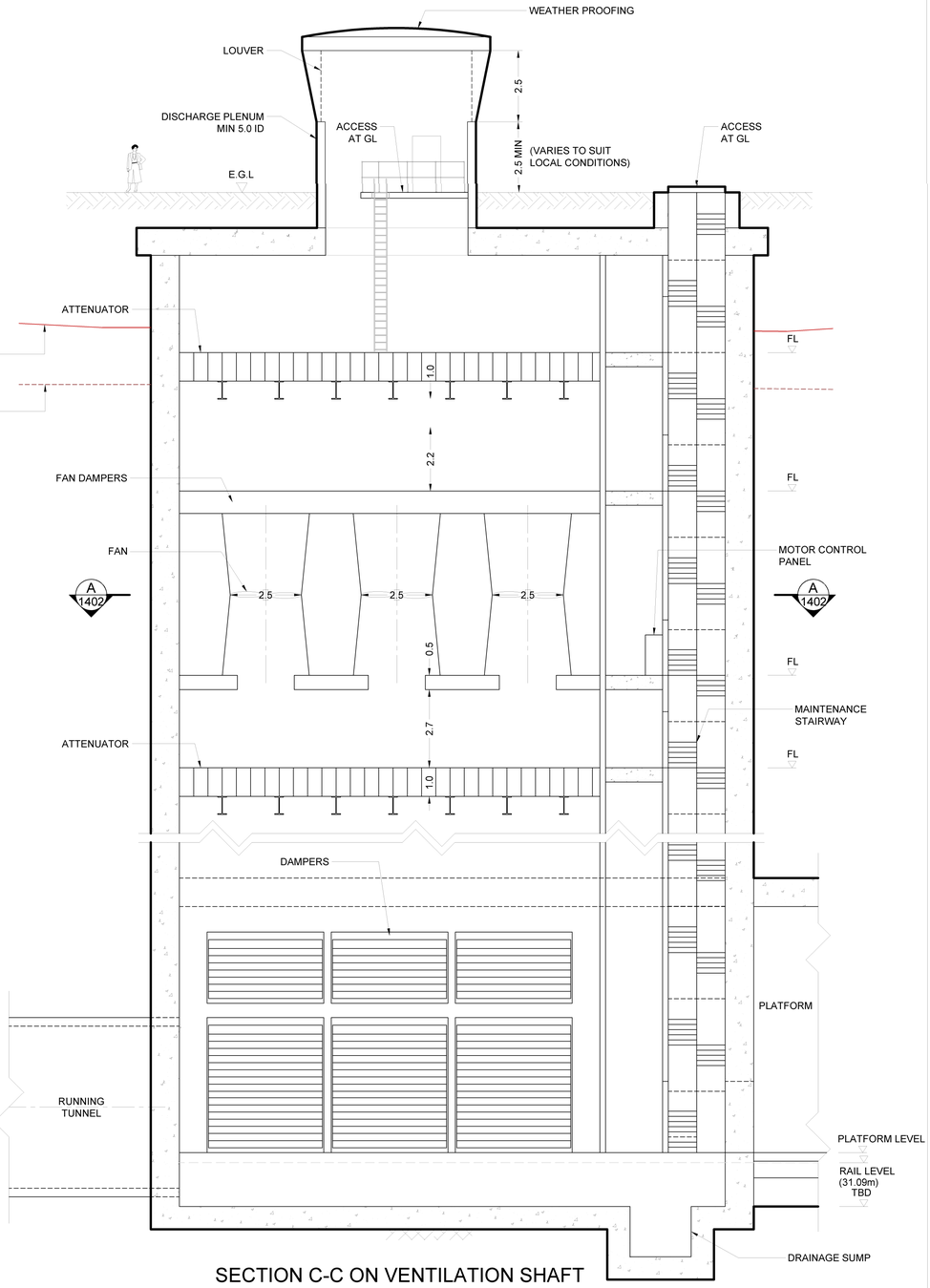

## PLAN A-A AT FAN GALLERY LEVEL

SCALE: 1/400 @ ANSI B
SCALE: 1/200 @ ANSI D




## SECTION B-B ON VENTILATION SHAFT

SCALE: 1/200 @ ANSI B
SCALE: 1/100 @ ANSI D




## SECTION C-C ON VENTILATION SHAFT

SCALE: 1/200 @ ANSI B
SCALE: 1/100 @ ANSI D

Key Plan:

Notes:
1. The information shown on this drawing is preliminary, for outline planning purposes only. The tunnels, stations and shaft details and outlines are subject to further geotechnical and other infrastructure investigations and to ongoing railway alignment development.
2. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
3. All dimensions are in metres unless shown otherwise.
4. Geological information from alignment profile by Delcan (dated: June '09)

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair via a Downtown LRT Tunnel

0m 5 10 15
Scale 1:200 @ ANSI B Scale 1:100 @ ANSI D

0m 2 4 6 8
Scale 1:100 @ ANSI B Scale 1:50 @ ANSI D

Ottawa
Delcan
Halcrow

Section:
Typical On-Line Ventilation Shaft
TTDOTT-HGL-00-XX-DR-01402

Revision: 01
Sheet: 1-1

| Rev | By | Chkd | Aprvd | Date | Description |
|---|---|---|---|---|---|
| 01 | MGD | JMB | JMB | 02/12/09 | FIRST ISSUE |

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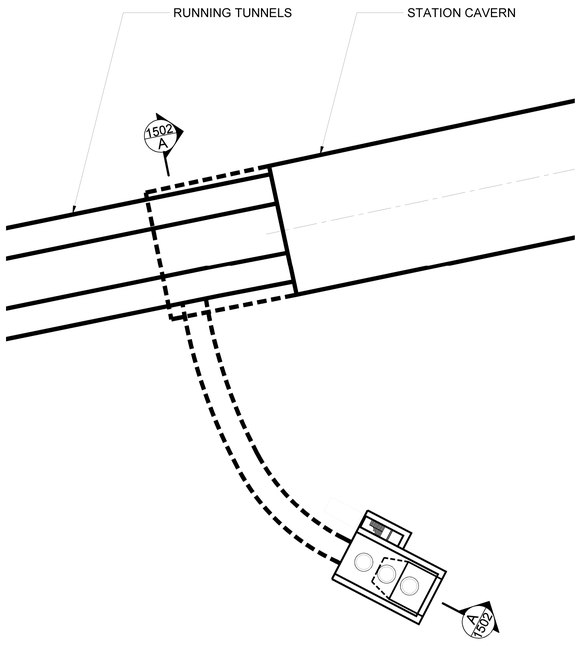
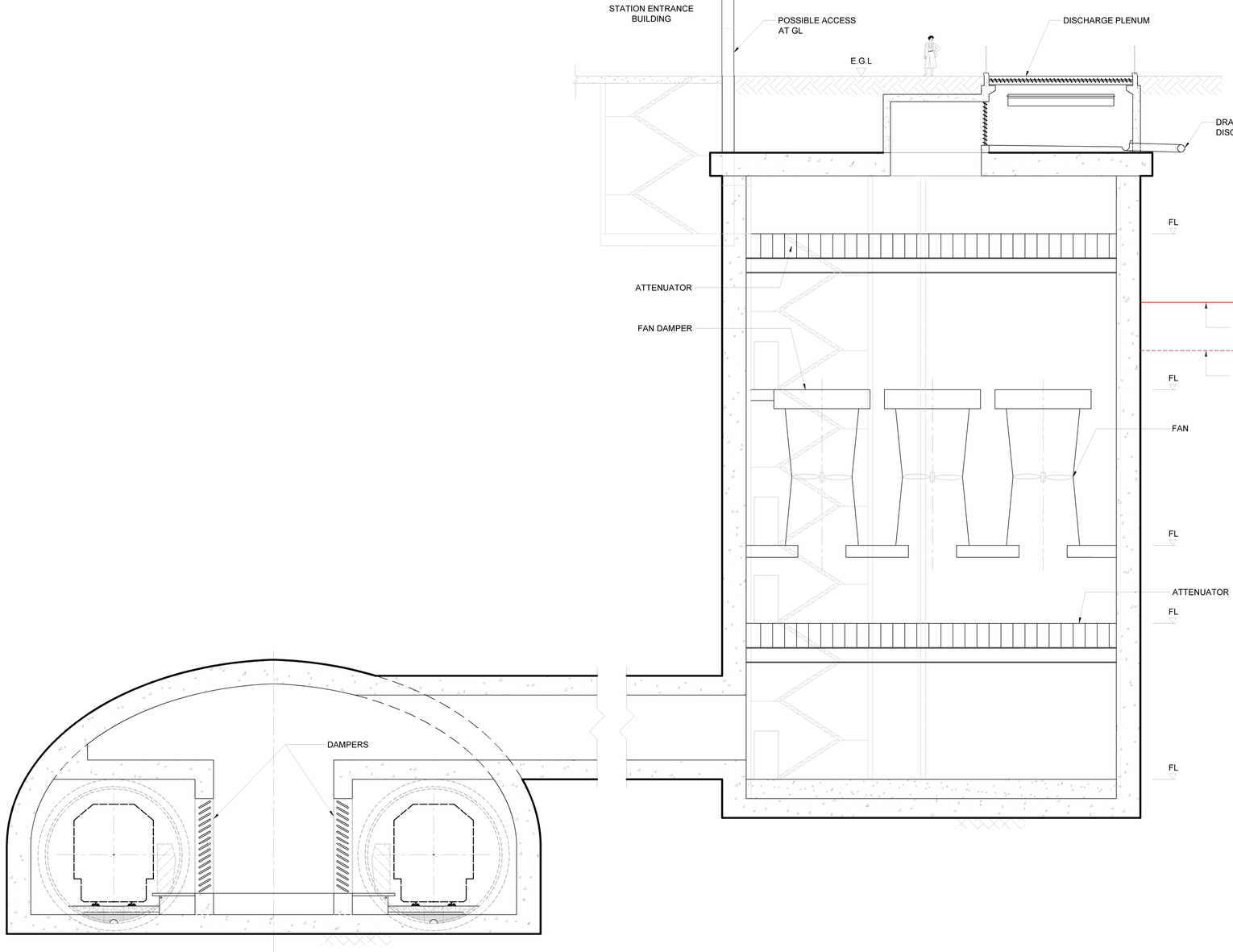
Last Saved: December 3, 2009
File Name: C:\documents And Settings\davismp\pw_drafting\dms00093\TTDOTT-HGL-00-XX-DR-C-01402-01.01.dwg




PLAN

SCALE: 1:1000 @ ANSI B

SCALE: 1:500 @ ANSI D




SECTION A-A

SCALE: 1/200 @ ANSI B

SCALE: 1/100 @ ANSI D

Key Plan:

Notes:

1. The information shown on this drawing is preliminary, for outline planning purposes only. The tunnels, stations and shaft details and outlines are subject to further geotechnical and other infrastructure investigations and to ongoing railway alignment development.
2. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
3. All dimensions are in metres unless shown otherwise.
4. Geological information from alignment profile by Delcan (dated: June '09)

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair via a Downtown LRT Tunnel

0m 5 10 15

Scale 1:200 @ ANSI B Scale 1:100 @ ANSI D

0m 2 4 6 8

Scale 1:100 @ ANSI B Scale 1:50 @ ANSI D

Ottawa Delcan Halcrow

Section:

## Typical Off-Line Ventilation Shaft

TTDOTT-HGL-00-XX-DR-01502

Revision: 01

Sheet: 1-1

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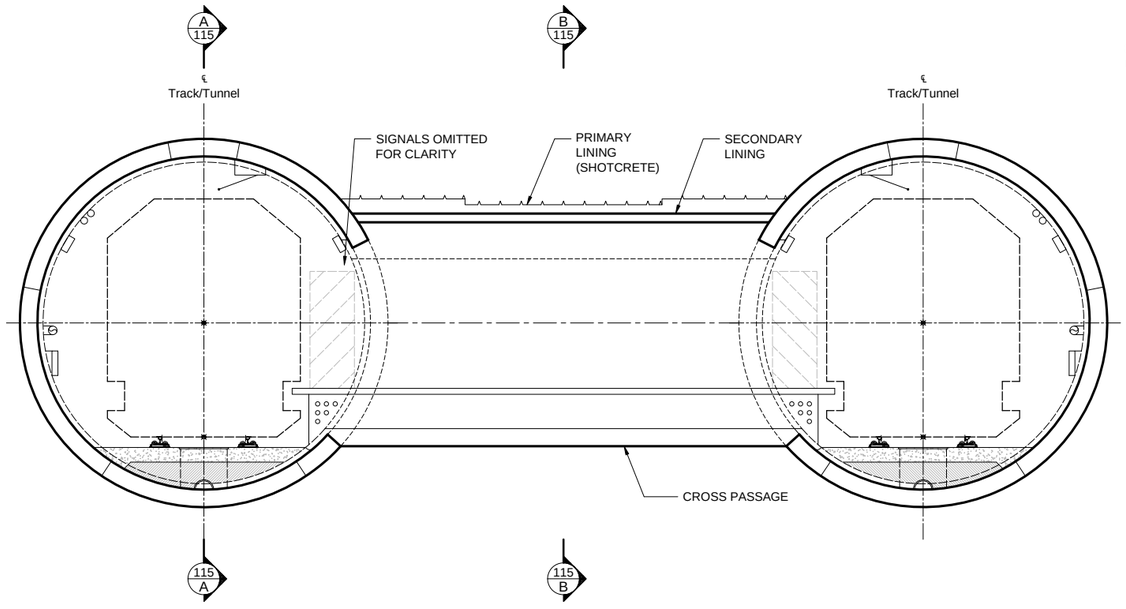
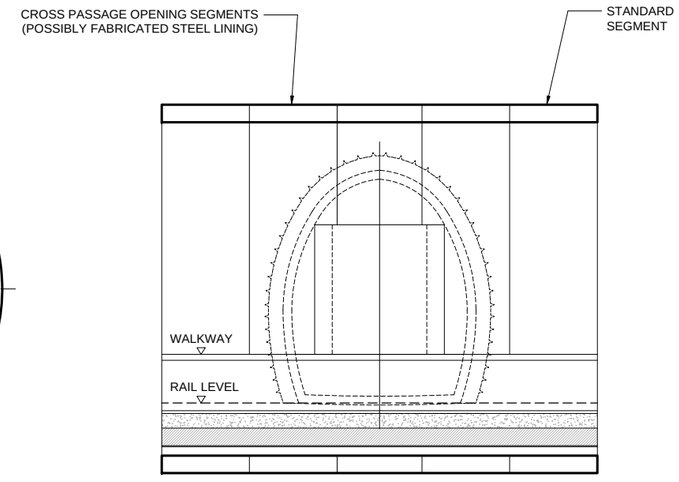
Last Saved: December 3, 2009

File Name: C:\documents And Settings\davismp\pvc_drafting\ms0009\3TTDOTT-HGL-00-XX-DR-C-01502-01.01.dwg



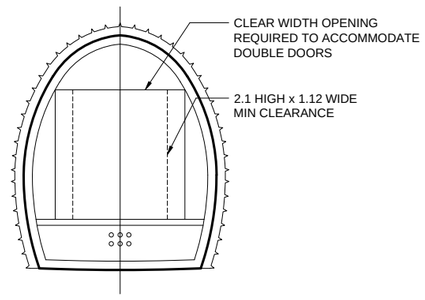

## SECTION ON RUNNING TUNNEL

Scale 1:50 @ ANSI D
Scale 1:100 @ ANSI B




## SECTION A-A

Scale 1:50 @ ANSI D
Scale 1:100 @ ANSI B




## SECTION B-B

Scale 1:50 @ ANSI D
Scale 1:100 @ ANSI B

Key Plan:

DRAFT FOR DISCUSSION

Notes:

1. Information shown is based on City of Edmonton LRT Design Guidelines (Feb. 2005) and NFPA 130 2007.
2. All dimensions are in metres unless shown otherwise.

# Downtown Ottawa Transit Tunnel

## Tunney's Pasture to Blair Via Downtown LRT Tunnel

0m 2 4 6 8

Scale 1:50 @ ANSI D
Scale 1:100 @ ANSI B

Ottawa
Delcan
Halcrow

Section: Typical Cross Sections Cross Passage

TTDOTT-HGL-00-XX-DR-00115

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Sheet: 1-1

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| 01 | JR | JMB | JMB | 12/10/09 | First Issue |

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