



Hamilton Rapid Transit Preliminary Design and Feasibility Study

B-LINE

PROJECT CONSTRAINTS ASSESSMENT

Version:2.0



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February 2012



An agency of the Government of Ontario



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1.0 General

This report focuses on a high level assessment of the constraints imposed by the existing conditions on the desired alignment along the corridor.

The constraints assessed in the preliminary design phase are shown in a matrix and are evaluated against the conceptual design exhibited in Design Workbook 2 version 2. In some circumstances, site inspections were undertaken to ascertain constrained conditions and to evaluate opportunities for improvement.

2.0 Subsurface Infrastructure

All surface features impacted by the design (i.e. trees, property, Heritage sites etc.) are identified in the constraints matrix below.

The constraints considered at this stage of design for the subsurface infrastructure are identified in the utility relocation strategy, under separate cover.

Also, as the actual depths of cover for the utilities are unknown, the utilities were also identified as a risk, as part of the 'Risk Assessment Report' also under separate cover.

3.0 Surface Infrastructure and Property Impact

The constraints matrix evaluates impacts to property in terms of access, land and building façade.

Several sites where initial impacts were determined were looked at individually, and design options were analyzed to try and mitigate impacts to property, particularly to access and building façade. This design exercise resulted in optimizing three stop configurations in order to mitigate property impacts; the stops at First Place and Sherman changed from side platforms to central, and the side platforms at the Delta stop were offset further to the north to avoid pedestrian access to the properties adjacent to the east bound platform.

4.0 Archaeological Resources

There were no archaeological features identified as constraints in the development of the preferred alignment during the preliminary design phase, as it was developed on a previously disturbed corridor.

A Stage 1 Archaeological Assessment was done by Archaeological Services Inc. under separate cover.

During the next design phase, a Stage 2 Archaeological investigation should be carried out if certain areas of the project are developed on undisturbed land, such as sites that might be identified for underground traction power substations.

It should be confirmed in the next design phase if a Stage 2 Archaeological investigation should be carried out for the proposed Maintenance and Storage Facility.

5.0 Built Heritage and Cultural Heritage

Several design iterations were carried out to avoid impacts to Heritage sites identified in the archaeological survey as belonging to the following classification;

1. Designated under part IV of the Ontario Heritage Act;
2. Built Heritage Resource
3. Cultural Heritage Landscape (CHL);
4. Vacant/Alter parcels located on CHL.

Priority was given to avoid impacts to buildings in these properties rather than impacts to land.

The preliminary alignment was cross-referenced against the Cultural Assessment Report done by Archaeological Services Inc., under separate cover.

6.0 Potential Matters of Provincial Importance

During the alignment design it was evaluated that a new bridge structure would be required over the Highway 403, a provincial highway. Preliminary discussions have taken place with the Ministry of Transportation Ontario (MTO), and they have agreed on the conceptual design.

Further discussions should take place with the MTO in the next design phase.

Further details of the bridge over Highway 403 are under the 'Bridge over Highway 403 Options Report', under separate cover.

7.0 Potential Matters of Aboriginal Nature, Treaty Rights and Natural Heritage

Modifications to the existing Red Hill Valley Parkway are proposed at a conceptual level, in order to accommodate the fixations of the track as well as the additional loading to the bridge as a result of the LRT.

As the Red Hill Valley Parkway is over land of natural and potentially Aboriginal significance, as well as close to the Red Hill Valley Creek, measures were taken to ensure minimal impacts to the surrounding areas. The preferred design alternative is outlined in the 'Preliminary Design – Red Hill Valley Parkway Structural Design Brief', under separate cover.

Further design efforts should continue while being cognisant of areas with potential natural importance. Three sites were identified as having natural heritage significance along the corridor and may need to be investigated in the detail design phase: Chedoke Creek Crossing, Gage Park and the Red Hill Creek Crossing.

8.0 Contaminated Sites/Soils

An aerial map showing contaminated sites was provided by the City along with a Geotechnical report conducted by Dillon in 2009.

The properties listed in both above documents were cross-referenced with the property impacts listed in the constraints matrix. It is recommended that prior to initiating field works in these areas contingency plans to handle potentially impacted soil and/or contaminated water generated during potential dewatering activities should be developed. The Contaminated Sites Management Guideline developed by the City should be followed.

Also, potential dewatering measures should be developed at the Maintenance and Storage Facility site if required. The Contaminated Sites Management Program for Municipal Works should be followed during the selection process for the MSF facility.

9.0 Road Space Requirements and Traffic Management

As the alignment goes through the downtown core, an area which is predominantly built-up, the main constraint of this project is the lack of space through the width of the corridor to accommodate all modes within the system. In these cases of constrained cross-section, the preliminary design was optimized in accordance with the City's desired hierarchy of users. Therefore, in order to accommodate the guideway and all the remaining system users, the traffic lanes were developed using the minimum acceptable widths, and if there was still insufficient space, removing turning lanes was assessed. Only after these two options were considered and constraints still persisted did the design team assess the possibility of optimizing the sidewalks to minimum acceptable widths.

Traffic Management was assessed in the construction staging and traffic management plan, under separate cover.

10.0 Conclusion

This assessment should be used as a base for discussion and further investigation in the next design phase. The objective of minimizing impacts to property, natural and built heritage, and archeological sites while still maintaining LRT passenger and pedestrian hierarchy, should be carried forward to the next design phase to optimize the design once further information and decisions have been undertaken.

11.0 Constraints Matrix

Please see the table below for the Constraints Matrix of the alignment within the entire corridor.

Constraints Assessment Matrix - Sta E a0+000 to 13+540										
Item Number	Section		DW # 2		Current Design		Rationale for difference		Additional Notes	
	From (Station)	To (Station)	North Side	South Side	North Side	South Side				
			(Column A)	(Column B)	(Column C)	(Column D)				
1	E a0+000 McMaster University Campus	E a0+235 McMaster University Campus	A.1) Encroaches on to McMaster Campus along Cootes Drive	B.1) Within existing ROW	C.1) Property impact tapers from 7.4 m to 0 m along 65 m. Configuration minimizes impact on parking lot, adds maintenance platform as well as provides space for staff room.	D.1) Within existing ROW.				
2	E a0+235 McMaster University Campus	E a0+522 East of Broadway Street	A.1) Encroaches on to McMaster University Hospital property.	B.1) Within existing ROW	C.1) From Station E a0+287 to Sta a0+522 property impacts on McMaster Campus taper from 0m to 7.7 m along 230 m.	D.1) Within existing ROW.				
3	E a0+522 East of Broadway Street	E0+310 East of Forsyth Avenue	A.1) Within existing ROW, central median to be removed to accommodate LRT.	B.1) Within existing ROW	C.1) From Sta a0+522 to a0+570 property impacts on McMaster Campus taper from 7.5 m to 0 m along 45m.	D.1) Within existing ROW.				
4	E a0+000 McMaster University Campus	E a0+235 McMaster University Campus	A.1) Encroaches on to McMaster Campus along Cootes Drive	B.1) Within existing ROW	C.1) Property impact tapers from 7.4 m to 0 m along 65 m. Configuration minimizes impact on parking lot, adds	D.1) Within existing ROW.				
5	E a0+235 McMaster University Campus	E a0+522 East of Broadway Street	A.1) Encroaches on to McMaster University Hospital property.	B.1) Within existing ROW	C.1) From Station E a0+287 to Sta a0+522 property impacts on McMaster Campus taper from 0m to 7.7 m along 230 m.	D.1) Within existing ROW.				
6	E a0+522 East of Broadway Street	E0+310 East of Forsyth Avenue	A.1) Within existing ROW, central median to be removed to accommodate LRT.	B.1) Within existing ROW	C.1) From Sta a0+522 to a0+570 property impacts on McMaster Campus taper from 7.5 m to 0 m along 45m.	D.1) Within existing ROW.				
7	E0+310 Stroud	E0+440 Dalewood	No impacts	11 Small Trees to be removed due to central median	No impacts	11 Small Trees to be removed due to central median				
8	E0+440 Dalewood	E0+600 Haddon	3 mature trees to be removed	No impacts	3 mature trees to be removed	Driveway at property 1, 2.5 m takeoff for 100 m of properties 1 and 88 1 bus shelter 3 mature trees to be removed	- 2.5 m sidewalk width - Lane widths as per typical sections - 3 mature trees to be removed on south side as a			

Constraints Assessment Matrix - Sta E a0+000 to 13+540									
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	From (Station)	To (Station)	North Side	South Side	North Side	South Side			
			(Column A)	(Column B)	(Column C)	(Column D)			
9	E0+600 Haddon	E0+700 Cline	Taking 1 property at Haddon (property 1144 Mr. Sub) approx. 1.5 along the property, for approx. 15 m till widens back to 2.5 m	No impacts	Partially taking property along 1144 for sidewalk. At property 1100 on north side of Cline (E0+700) sidewalk tapering to 2.2 m to save basement access of property	Parking at property 1117, Tapers from 1m to 2.5 m for 90 m			
10	E0+700 Cline	E0+955.6 Newton/Highway 403 ramp	2 small trees, 3 mature trees	Cline to Dow : taking 3.5 m for 100 m and Dow to Ramp: taking 4 m for 155 m	5 mature trees, 3 small trees to be removed	3.5 m for 73 m of property 1107 (church) 3.5m for 40m just east of Dow Ave. (residential) 3.5m for 40m of property 1055/1057 (commercial) 2.5m sidewalk flush with building at property 1055, access ramp reconfiguration required during detail design. Property takeoff tapers from 4m to 1m of 1033 and 1029 (Columbia international college and residence), 14 mature trees to be removed			
11	E0+955.6 Newton/Highway 403 ramp	E1+170 Paisley	Within existing ROW, 1 mature tree, 5 small trees to be removed	Tapers from 6.5 m down to 4 m for 215 m	Within existing ROW. 1 mature tree, 5 small trees to be removed Sidewalk widening required to 2.5m within existing ROW	Tapers from 4 m (at E1+005) down to approx. 0.5 m (at E1+050) 4 mature trees to be removed.	2.5 m sidewalk width		
12	E1+170 Paisley	E1+350 Longwood	Within existing ROW	Tapers from 2 m to 6 m	Sidewalk tapers down to 2.3 m at property 918 in order save property. Property taking taper from 1.5m to 6m at property 906.	From 1.5 m for 40 m of property immediately west of 925. taper from 1.5m to 3.5 m for 50m, property 925 3.5m for 40m of property 925	DW#2 did not provide continuity with road lengths as required		
13	E1+350 Longwood	E1+581.85 Paradise	2 m for 230 m	Tapers from 2.5 m down to 0 m at Paradise	Tapers from 4.5 m at Longwood down to 2.5 m at Paradise of property 700	Tapers from 5 m at Longwood down to 0 m in the vicinity of Paradise (at E1+516)	- 2.5 m sidewalk width Lane widths as per typical sections		
14	E1+581.85 Paradise	E1+779 Maklin	No impacts	3 small trees to be removed	No impacts	3 small trees to be removed			

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			(Column A)	(Column B)	(Column C)	(Column D)			
15	E1+779 Maklin	E2+075 Bridge over Highway 403	4 small trees	16 mature trees to be removed.	Design developed within existing ROW. Parking lot impact is avoided by applications of a retaining wall, see section E2+000 on cross section drawing. Parking lot seems to be in public space (requirement of retaining wall shall be confirmed by City) 4 small trees	Tapers from 0m to 2.5m from E1+810 to E1+855 and back to 0m from E1+855 to E1+875 16 mature trees to be removed.	Both designs are using the same LRT alignment for the bridge over Highway 403 but current design accounts for new sidewalk pushed to the south, adding bike lane, 2.5 m sidewalk width. If sidewalk width of 2.5 m is maintained, bridge widening of approx 1.5 m required. City to determine	As survey information in this section is lacking, tree impact on current design assessed via Google Maps.	
16	E2+075 Bridge over Highway 403	E2+745 New Street	A.1) Within existing ROW	B.1) Driveways closed adjacent of property 651.	C.1) Access hatches to CSO tank will not be impacted. C.2) Property 676 sidewalk tapers to 2.4 m as building is at property face. Property impact tapers from 0 to 0.6 m for 14 m C.3) At property lot 622/620 1 m property impact for 35 m. 2. C.4) At property 612 (Animal Hospital, as shown through Google Map) sidewalk tapers to 1.5 m. If entrance can be modified to accommodate side staircase rather than central staircase, can extend sidewalk to 2.5 m. Property takeoff of 0.6 m for 11 m and 1.5 m for 11m	D.1) At property west of 651, property impacts taper from 1.3 m to 0 m over a length of 35m. D.2) At property 631, property impact tapers from 0.2 to 0.5 for 36 m. D.3) At property 621, 0.5 m property impact for 8 m. D.4) At property 619, sidewalk down to 1.7 m for 20 m due to building face right at property line. D.5) At property 615, 0.8m property impact for 20m.	Property impacts due to 2.5 m sidewalk widths		
17	E2+745 New Street	E2+880 Strathcona Avenue	A.1) Within existing ROW	B.1) Within existing ROW	C.1) At property lot 610, taking roughly 0.5 m for 60 m. C.2) At property 570, taking 0.4 m for 30 m, do not affect entrance ramp of property. C.3) At property 560 taking 0.2 m for 12 m. C.4) At property 554, sidewalk tapers down to 2.1 m because building face is right at property line.	D.1) Within existing ROW	Property impacts due to 2.5 m sidewalk widths		

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	From (Station)	To (Station)	North Side	South Side	North Side	South Side			
			(Column A)	(Column B)	(Column C)	(Column D)			
18	E2+880 Strathcona Avenue	E3+065 Locke Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) At Victoria Park, require 1.6m for approximately 135 m to widen sidewalk to 2.5 m and maintain existing boulevard. The current sidewalk at that location is set back within the property limits. C.2) 3 mature trees, 3 small trees to be removed.	D.1) Within existing ROW	Property impacts due to existing set back in sidewalk, 2.5 m sidewalk widths.		
19	E3+065 Locke Street	E3+325 Ray Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW			
20	E3+325 Ray Street	E3+465 Queen Street	A.1) Towards Queen street, new curb encroaches on property limit.	B.1) Southside Queen stop encroaches 1 m along the block from Ray to Queen	C.1) At property 378, property impact of 0.6 m for 6m. C.2) At property 374, sidewalk to go down to 2 m as building face is at property line. C.3) At properties 370, 368 and 366, sidewalk goes down to 2.1 m at tree well locations only. C.4) Along property lot 354, property impact tapers from 0m to 2.5m for 75m.	D.1) Within existing ROW	Property impacts due to 2.5 m sidewalk widths.		
21	E3+465 Queen Street	E3+590 Hess Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW. But as buildings are right at building face, sidewalk in front of properties 306 and 300 are 1.6 m and 1.5 m respectively.	D.1) Along property 15 (heritage building), property impact tapers from 1.8 m to 0.5 m along 44 m. D.2) At property 285, property takeoff tapers from 0.5 m to 0.3 m for 27m. D.3) At property 275 property tapers from 0.3 m to 0 m for 18 m	At property 15, accounted for future redevelopment of site to residential condominium.		
22	E3+590 Hess Street	E3+745 Caroline Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW			
23	E3+745 Caroline Street	E3+900 Bay Street	A.1) Encroaches approx. 1 m along 70 m at property lot 191/185	B.1) Within existing ROW	C.1) Within existing ROW	D.1) At property lot 191/185, property impact tapers from 0 m to 1m along 70 m.			

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			(Column A)	(Column B)	(Column C)	(Column D)				
24	E3+900 Bay Street	E4+160 Macnab Street	A.1) Within existing ROW	B.1) Encroach on the parking lot east of Bay Street, approximately 1 m along 45m.	C.1) Within existing ROW	D.1) At parking lot just east of Bay Street, property impact tapers from 0.6 m to 0 m along 45 m. D.2) Slightly west of Summer's Lane (the art museum), sidewalk tapers to 2.4 m as building face protrudes beyond ROW.				
25	E4+160 Macnab Street	E4+540 John Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW. Sidewalk behind platform at property 21 only 2.2 m as building face is right at property line.				
26	E4+540 John Street	E4+850 Walnut Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW, but behind Walnut stop, sidewalk tapers down to 2.4 m as building face at property 193 is right at property line.	D.1) Within existing ROW				
27	E4+850 Walnut Street	E5+184 Wellington Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) At property 220/224, sidewalk tapers down to 2.2, as building face is right at property line.		On the south side from property 220 to 234, parking bay may be reduced to 2.6m to		
28	E5+184 Wellington Street	E5+380 Victoria Avenue	A.1) Encroaches slightly at property 399	B.1) Encroaches at Southwest corner of West Avenue	C.1) Revised design has First Place Stop in the centre as opposed to the side running stop in DW2 to accommodate emergency access lane. C.2) Property impact at 399 of 2.5 m for 70m. C.3)) Property impact tapers from 0.9 to 0 m for 11 m at Property 2.	D.1) Within existing ROW				
29	E5+380 Victoria Avenue	E5+700 Tisdale Street	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW				

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			(Column A)	(Column B)	(Column C)	(Column D)				
30	E5+700 Tisdale Street	E6+020 Wentworth Street	A.1) Within existing ROW	B.1) Access to properties 652, 656, 660 and 662 affected due to side running stop location. Immediately west of Wentworth, traffic lanes open up from one lane to two.	C.1) Within existing ROW	D.1) Revised stop design has centre running Wentworth stop to avoid property impacts on south properties between Grant and Wentworth. D.2) Adjacent of Wentworth stop is one lane and opens up to two lanes west of Ashley Street.				
31	E6+020 Wentworth Street	E6+340 Arthur Avenue	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW				
32	E6+340 Arthur Avenue	E6+883 Sherman Avenue	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW	D.1) Within existing ROW				
33	E6+883 Sherman Avenue	E7+265 East of Carrick Avenue	A.1) Within existing ROW	B.1) Access to properties 924, 928, 930 affected due to side running stop at Sherman	C.1) Within existing ROW	D.1) Revised stop design is centre running at Sherman to allow for property access on south side properties east of Sherman.				
34	E7+265 East of Carrick Avenue	E7+575 Leinster Avenue South	A.1) Encroaching onto Scott Park property	B.1) Staggered platform, affecting access to properties 1094, 1098 and 2, east of Leinster Avenue.	C.1) East of Lottridge Street at Station E7+418, the existing curb location allows for a lane in excess of 4m, and the excess portion is delineated by pavement markings. In detail design, it can be assessed to move the curb in order to widen the existing sidewalk. C.2) At property 1025 (Westminster Church west of Melrose Avenue as shown on Google Maps), property impact tapers from 0 m to 3.4 m for 16.5m. C.3) At Scott Park property impact tapers from 5.8m to 5.5 m for 90m. C.4) Infront Scott Park Arena property impact tapers from 5.5m to 0 m for 38 m	D.1) Both sides of Scott Park Stop now parallel to each other and moved slightly to the north to allow access to south side properties with a minimum sidewalk width of 2.5m.	Property impacts due to 2.5 m sidewalk widths and stop configuration			

Constraints Assessment Matrix - Sta E a0+000 to 13+540								
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	From (Station)	To (Station)	North Side	South Side	North Side	South Side		
			(Column A)	(Column B)	(Column C)	(Column D)		
35	E7+575 Leinster Avenue South	E7+885 Fairview Avenue	A.1) Encroaches property on the north side from Balsam Avenue to Connaught Avenue North	B.1) Within existing ROW	C.1) In front of Jimmy Thompson Memorial Pool east of the Scott Park Arena (as per Google Maps), widening sidewalk towards property line, impacting landscaped area, but still within existing ROW. C.2) In front of properties 1121, 1123, 1125 and 1127, east of Balsam Avenue North, widening sidewalk towards property line, impacting landscaped area, but still within existing ROW. C.3) From Connaught Avenue North to Fairview Avenue, the existing curb location allows for a lane in excess of 4m, and the excess portion adjacent of the guideway is delineated by pavement markings. In detail design, it can be assessed to move the curb in order to widen the existing sidewalk.	D.1) Between Leinster Avenue South and Balsam Avenue South moving outer curb north towards the street side to allow for 2.5m sidewalk and space for a boulevard and to flush the new curb with the proposed guideway edge.	No property impacts beyond the existing ROW.	
36	E7+885 Fairview Avenue	E8+300 Belmont Avenue	A.1) Within existing ROW	B.1) Within existing ROW	C.1) From Fairview Avenue to Belmont Avenue, the existing curb location allows for a lane in excess of 4m, and the excess portion adjacent to the guideway is delineated by pavement markings. In detail design, it can be assessed to move the curb in order to widen the existing sidewalk. C.2) Impact of property lot 1273 at E8+275 from 0m to 1.4m for 32m.	D.1) In front of property 1174, at E7+920, northside outer curb is being moved south towards property line to accommodate the guideway. D.2) East of Bend Avenue, guideway is at-grade with CP rail crossing. D.3) Hilda Avenue to be closed.		

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			(Column A)	(Column B)	(Column C)	(Column D)		
37	E8+300 Belmont Avenue	E8+443 Kensington Avenue South	A.1) Encroaches slightly into property of 1309	B.1) Within existing ROW	C.1) Property impact in front of funeral home (as per Google Maps) from 4.77m to 4m along 50m.	D.1) Delta stop has been moved slightly towards the north to avoid impacts on property access adjacent to the eastbound ramp. D.2) Main Street East narrowed by slightly moving the curb as well as with pavement marking. Proposed road configuration sufficient for left turning movements for cars, but trucks will have to encroach on pavement marking while making a left turn.		
38	E8+443 Kensington Avenue South	E8+787 Ottawa Street South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) In front of Memorial School (as per Google Maps) property impacts taper from 0.5m to 0.6m along 87m to accommodate stop configuration. May impact one mature tree.	D.1) From Kensington Ave South to Grosvenor Ave South moving the back end of the sidewalk curb slightly towards the property line, but still within existing ROW to accommodate 2.5m sidewalk. D.2) 3 Grovesnor Avenue at E8+700, and 1190 Main Street at E8+750, driveways are to be closed to accommodate stop platform. Access will be via the back lane from Grovesnor.		
39	E8+787 Ottawa Street South	E8+946 Edgemont Street South	A.1) Within existing ROW	B.1) Within existing ROW.	C.1) From London Street North to Edgemont Street North, introducing bumpouts to delineate provided parking lane and provide a shorter crosswalk distance for pedestrians. Within existing ROW.	D.1) At property 1198 (E8+800), property impact tapers from 0 to 0.91 m for 32 m. D.2) At property 1208 (E8+834) property impact 0.9 m for 13m. D.3) At property 1210 (E8+842) property impact tapers from 0.9 to 1 m for 12 m. D.4) At property east of London Street property 18/1212/1230 (E8+900) property impact tapers from 0.9 to 0 m for 52m. 1 mature tree impacted. D.5) Left-side curbs at London Street South and Edgemont Street South tapered to accommodate one way traffic and encourage left turning movements on the flushed section of the guideway.	Incorporation of bumpouts to delineate parking lane	

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Item Number	Section		DW # 2		Current Design		Rationale for difference	Additional Notes
	From (Station)	To (Station)	North Side	South Side	North Side	South Side		
			(Column A)	(Column B)	(Column C)	(Column D)		
40	E8+946 Edgemont Street South	E9+200 Graham Avenue South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) From Edgemont Street North to Graham Avenue North, introducing bumpouts to delineate provided parking lane and provide a shorter crosswalk distance for pedestrians. Within existing ROW.	D.1) Left-side curbs at Park Row South, Province Street South and Graham Avenue South tapered to accommodate one way traffic and allow left turning movements on the flushed section of the guideway. Within existing ROW.	Incorporation of bumpouts to delineate parking lane	Delineation of curbs at intersections on the south side allow for proper equipment of snow removal.
41	E9+200 Graham Avenue South	E9+442 Huxley Avenue South	A.1) Within existing ROW	B.1) Within existing ROW.	C.1) From Graham Avenue North to Huxley Avenue North, introducing bumpouts to delineate provided parking lane and provide a shorter crosswalk distance for pedestrians. Within existing ROW.	D.1) Left-side curbs at Graham Avenue South, Wexford Avenue South and Huxley Avenue South tapered to accommodate one way traffic and allow left turning movements on the flushed section of the guideway. Within existing ROW.	Incorporation of bumpouts to delineate parking lane	Delineation of curbs at intersections on the south side allow for proper equipment of snow removal.
42	E9+442 Huxley Avenue South	E9+773 Garside Avenue South	A.1) Slightly narrowing sidewalk	B.1) Affecting property access for properties 1384 and 1388 east of Tuxedo Avenue due to Kenilworth stop configuration.	C.1) Property impact at parking lot (as per Google maps) at E9+500 (right at matchline) tapers from 0 to 1.8 m for approximately 20m. C.2) Sidewalk tapers to 1.6m from property 1373 (E9+540) to property 1403 to accommodate two lanes; one 4 m lane adjacent to platform and one 3.3 m right turn lane. C.3) At Crosthwaite Avenue North and Garside Avenue North, introducing bumpouts to delineate provided parking lane and provide a shorter crosswalk distance for pedestrians. Within existing ROW.	D.1) Between Tuxedo Avenue South and Kenilworth Avenue South, property impact of 2.5 m for 60 m along properties 1384, 1388, 1390 and 1392. D.2) At property 1384, closing existing driveway, proposing new driveway from Tuxedo Avenue South, resulting in reconfiguration of parking spaces. D.3) At property 1388, closing existing driveway resulting in loss of access to property. Recommend property 1388 be bought out of Owner does not accept loss of access to property. D.4) Kenilworth stop combined with adjoining sidewalk to result in raised sidewalk with multiple access ramps. D.5) Left-side curbs at Crosthwaite Avenue South and Garside Avenue South tapered to accommodate one way traffic and encourage left turning movements on the flushed section of the guideway. Within existing ROW.	Current design maintains a separation between eastbound platform at stops and adjoining sidewalk. Incorporation of bumpouts to delineate parking lane.	Delineation of curbs at intersections on the south side allow for proper equipment of snow removal.

Constraints Assessment Matrix - Sta E a0+000 to 13+540								
Item Number	Section		DW # 2		Current Design		Rationale for difference	Additional Notes
	From (Station)	To (Station)	North Side	South Side	North Side	South Side		
			(Column A)	(Column B)	(Column C)	(Column D)		
43	E9+773 Garside Avenue South	E10+115 East of Tragina Avenue South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) From Garside Avenue North to Tragina Avenue North, introducing bumpouts to delineate provided parking lane and provide a shorter crosswalk distance for pedestrians. Within existing ROW.	D.1) Left-side curbs from Garside Avenue South to Tragina Avenue South tapered to accommodate one way traffic and encourage left turning movements on the flushed section of the guideway. Within existing ROW.	Incorporation of bumpouts to delineate parking lane	Delineation of curbs at intersections on the south side allow for proper equipment of snow removal.
44	E10+115 Weir Street South	E10+365 East of Berry Avenue	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Bumpouts are introduced on the north side at Weir Street North and Fairfield Avenue to provide shorter walking distance towards Fairfield Avenue and provide a delineation for a street parking lane. Within existing ROW.	D.1) Within existing ROW except just east of Berry, property impact on landscaped area tapering from 2.8 to 3.6 m for 4.7 m.		
45	E10+365 East of Berry Avenue	E10+665 East of Rosewood Road South	A.1) Within existing ROW	B.1) Strathearne Stop was flushed with the sidewalk, resulting in the closure of Bell Avenue to accommodate the stop platform.	C.1) Within existing ROW	D.1) Strathearne Stop is now aligned at the centre of the ROW, allowing for one active lane south of the eastbound track, keeping Bell Avenue open. D.2) Within existing ROW	No property impacts beyond the existing ROW.	
46	E10+665 East of Rosewood Road South	E10+935 East of Modena Court	A.1) Slightly encroaches west of Craigroyston Road until Walter Avenue to accommodate sidewalk.	B.1) Slightly encroaches west of Craigroyston Road until Walter Avenue to accommodate sidewalk.	C.1) Curb relocated to the north towards the property line to accommodate two westbound traffic lanes and sidewalk. Still within existing ROW.	D.1) Curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. Still within existing ROW.		

Constraints Assessment Matrix - Sta E a0+000 to 13+540										
Item Number	Section		DW # 2		Current Design		Rationale for difference		Additional Notes	
	From (Station)	To (Station)	North Side	South Side	North Side	South Side				
			(Column A)	(Column B)	(Column C)	(Column D)				
47	E10+935 East of Modena Court	E11+235 East of Parkdale Avenue South	A.1) Slightly encroaches west of Parkdale Avenue up to Parkdale Avenue to accommodate sidewalk.	B.1) Slightly encroaches west of Parkdale Avenue up to Parkdale Avenue to accommodate sidewalk.	C.1) Property impact tapers in front of Parkdale Park from 0 m to 10.5 m along 104 m. 3 small trees to be impacted. C.2) Property impact just east of Parkdale Avenue at property 261/265 tapers from 5.7 m to 0 m along 3.4 m. C.3) Sidewalk in front of property 261/265 tapers to 2.2 m and 2.3 m at corners as building face is right along property line.	D.1) Property impact tapers from 0 m to 5.4 m along 90 m. 1 small tree to be impacted. D.2) Sidewalk in front of St. Eugene's Church (as per Google Maps) tapers down to 1.7 m as building face is right at property line. D.3) Property impact just west of Parkdale Avenue south at parking lot of property 350 tapers from 9.7 m to 4.2 m along 27.2 m to accommodate sidewalk.				
48	E11+235 East of Parkdale Avenue South	E11+515 East of Delena Avenue South	A.1) Within existing ROW	B.1) Encroaches east of Parkdale Avenue to Adair Avenue to accommodate sidewalk.	C.1) Curb relocated to the north towards the property line to accommodate two westbound traffic lanes and sidewalk. Still within existing ROW. C.2) Sidewalk tapers to 1.6 m in front of property 271/275 as building face is right along property line.	D.1) Curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. D.2) Property impacts in front of property 280 taper from 4.5 m to 0 m along 78 m. D.3) Sidewalk tapers to 2 m in front of property 288 as building face is along property line. D.4) Sidewalk tapers to 2.1m in front of property 290 as building face is right along property line.				
49	E11+515 East of Delena Avenue South	E11+755 East of Reid Avenue South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) In front of property 385, sidewalk tapers to 1.5 m as limit of existing retaining wall limits sidewalk width.	D.1) Approximately 70 m long retaining wall proposed from just east of Reid Avenue south at E11+615. D.2) In front of property 83, sidewalk width tapers to 1.5 m as proposed retaining wall limits width of sidewalk. As per base information, existing sidewalk is also currently 1.5 m. D.3) In front of property 404, sidewalk tapers to 1.6 m as there is an existing retaining wall which limits sidewalk width.				
50	E11+755 East of Reid Avenue South	E12+025 East of Ramp from Northbound Red Hill Valley Parkway	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Within existing ROW. See separate Bridge over Red Hill Valley Structural Assessment Report for alignment details	D.1) Within existing ROW. See separate Bridge over Red Hill Valley Structural Assessment Report for alignment details				

Constraints Assessment Matrix - Sta E a0+000 to 13+540										
Item Number	Section		DW # 2		Current Design		Rationale for difference		Additional Notes	
	From (Station)	To (Station)	North Side	South Side	North Side	South Side				
			(Column A)	(Column B)	(Column C)	(Column D)				
51	E12+025 East of Ramp from Northbound Red Hill Valley Parkway	E12+325 East of Pottruff Road South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Property impact tapers from 2.4 m to 0 m along 40 m in front of property 20.	D.1) East of Pottruff Road South, curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. Still within existing ROW.				
52	E12+325 East of Pottruff Road South	E12+625 East of Queenston Place entrance (as per Google Maps)	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Property impact in front of property 519 tapers from 0.5 m to 0.7m along 10m. C.2) Property impact tapers in front of property 523 from 0.7m to 2m along 15m. C.3) Property impact of 2.3 m along 15.5 m in front of property 537. C.4) Property impact tapers from 2.3 m to 0 m along 43m in front of Red Rose Motel (as per Google Maps). C.5) Southside outer curb being moved north towards the property line to accommodate two westbound traffic lanes and sidewalk.	D.1) Curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. Still within existing ROW.				
53	E12+625 East of Queenston Place entrance (as per Google Maps)	E12+925 East of Nash Road South	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Curb relocated to the north towards the property line to accommodate two westbound traffic lanes and sidewalk. Still within existing ROW.	D.1) Curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. Still within existing ROW.				
54	E12+925 East of Nash Road South	E13+225 East of Clapham Road	A.1) Within existing ROW	B.1) Within existing ROW	C.1) Property impact in front of property 735 (planned development of Swiss Chalet) tapers from 2.1 m to 4.3 m along 61m. Impact to landscape area is foreseeable.	D.1) Curb relocated to the south towards property line to accommodate two eastbound traffic lanes and sidewalk. Still within existing ROW.				

Constraints Assessment Matrix - Sta E a0+000 to 13+540								
Item Number	Section		DW # 2		Current Design		Rationale for difference	Additional Notes
	From (Station)	To (Station)	North Side	South Side	North Side	South Side		
			(Column A)	(Column B)	(Column C)	(Column D)		
55	E 13+225 West of Greenford Driv	E13+451 east of Eastgate entrance	A.1) Bus Layout encroaches on to Eastgate Square Parking area.	B.1) Within existing ROW	A.1) Bus Layout encroaches on to Eastgate Square Parking area. Exact configuration to be determined in the next design phase in consultation with Property Owner	D.1) Within existing ROW.		
56	E13+451 east of Eastgate entrance	E13+540 Centennial Parkway	A.1) Bus Layout encroaches on to Eastgate Square Parking area.	B.1) Within existing ROW	A.1) Bus Layout encroaches on to Eastgate Square Parking area. Exact configuration to be determined in the next design phase.	D.1) Within existing ROW.		

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