

APPENDIX A

TRANSITWAY STATION ACTIVITY (Tunney's Pasture, Bayview & Lebreton Stations)

Summary of Existing Transit Services

Aug-10-2011

Notes:

- Transit operations based on Automatic Passenger Count - Point Check information provided by OC Transpo for Sept 2010 booking, except for Exhibit TR-4 which is based on scheduled stop times (Summer 2011).

- Transit operations have been categorized by the following time periods:

From:	To:	Period
0:00	5:59	Early AM
6:00	8:59	AM peak
9:00	14:59	midday
15:00	17:59	PM peak
18:00	20:59	evening
21:00	23:59	late night

- Estimates for the proportion of dead-heading buses on the Transitway are based on manual counts of "out of service" vehicles at Bayview Station on July 13th, 2011 & July 14th, 2011 (See Worksheets "Bayview EB" & "Bayview WB") :

	AM Peak		PM Peak	
	EB	WB	EB	WB
Total Vehicles / pd	389	293	290	375
In Service / pd	360	225	190	358
Out of service / pd	29	68	100	17
% out of service	7%	23%	34%	5%

Based on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking

TRANSIT ACTIVITY BY PERIOD

direction	period	type	Count of RUN	Sum of ONS	Sum of OFFS
EBND			1060	3071	1653
	AM peak		370	695	966
		BAR Express	58	81	200
		KNT Express and Rural-West	109	119	293
		Local	45	82	29
		Peak	21	4	27
		Peak-Interprovincial	9	35	0
		Transitway	128	374	417
	Early AM		19	32	14
		Local	3	3	0
		Transitway	16	29	14
	evening		105	200	68
		Local	16	14	3
		Peak	8	15	6
		Transitway	81	171	59
	late night		78	79	38
		Local	8	2	1
		Transitway	70	77	37
	midday		282	897	376
		BAR Express	5	8	20
		KNT Express and Rural-West	9	18	26
		Local	46	99	24
		Peak	1	0	0
		Transitway	221	772	306
	PM peak		206	1168	191
		Local	25	51	17
		Peak	16	45	25
		Peak-Interprovincial	9	30	0
		Transitway	156	1042	149
WBND			1026	1672	2969
	AM peak		227	207	955
		Local	10	7	46
		ORL Express and Rural-East	73	14	191
		Peak	16	35	30
		Peak-Interprovincial	6	0	55
		Transitway	122	151	633
	Early AM		12	7	18
		Peak	2	0	2
		Transitway	10	7	16
	evening		104	105	260
		BAR Express	5	3	0
		KNT Express and Rural-West	11	7	0
		Local	7	5	17
		Peak-Interprovincial	2	0	10
		Transitway	79	90	233
	late night		85	62	147
		Local	2	0	1
		Transitway	83	62	146
	midday		261	351	730
		Local	23	28	41
		ORL Express and Rural-East	9	0	15
		Peak	1	1	1
		Transitway	228	322	673
	PM peak		337	940	859
		BAR Express	61	170	23
		KNT Express and Rural-West	111	273	37
		Local	13	34	27
		Peak-Interprovincial	10	0	106
		Transitway	142	463	666
Grand Total			2086	4743	4622

TRANSIT ACTIVITY BY PERIOD

Direction	period	type	Count of RUN	Sum of ONS	Sum of OFFS
EBND			1060	915	1848
	AM peak		368	211	641
		BAR Express	58	22	115
		KNT Express and Rural-West	108	38	216
		Local	44	27	30
		Peak	20	3	16
		Peak-Interprovincial	9	18	0
		Transitway	129	103	264
	Early AM		18	6	2
		Local	3	1	0
		Transitway	15	5	2
	evening		105	111	72
		Local	16	9	6
		Peak	8	10	5
		Transitway	81	92	61
	late night		79	83	37
		Local	8	7	0
		Transitway	71	76	37
	midday		284	295	769
		BAR Express	5	2	24
		KNT Express and Rural-West	10	7	47
		Local	46	38	43
		Peak	2	1	1
		Transitway	221	247	654
	PM peak		206	209	327
		Local	26	17	25
		Peak	16	4	28
		Peak-Interprovincial	9	8	1
		Transitway	155	180	273
WBND			1156	1645	903
	AM peak		260	197	129
		Local	31	34	8
		ORL Express and Rural-East	74	7	8
		Peak	25	26	8
		Peak-Interprovincial	6	18	19
		Transitway	124	112	86
	Early AM		17	2	1
		Local	5	0	0
		Peak	2	0	0
		Transitway	10	2	1
	evening		113	286	104
		BAR Express	5	8	1
		KNT Express and Rural-West	11	22	4
		Local	16	9	8
		Peak	2	4	0
		Peak-Interprovincial	2	0	5
		Transitway	77	243	86
	late night		92	146	46
		Local	9	5	2
		Transitway	83	141	44
	midday		283	370	246
		Local	45	26	18
		ORL Express and Rural-East	8	1	2
		Peak	2	3	0
		Transitway	228	340	226
	PM peak		391	644	377
		BAR Express	61	96	12
		KNT Express and Rural-West	111	176	18
		Local	45	46	32
		Peak	22	11	4
		Peak-Interprovincial	10	3	70
		Transitway	142	312	241
Grand Total			2216	2560	2751

OBSERVED TRANSIT OPERATIONS AT: Bayview Station Eastbound

Bayview Station Eastbound - In Service Routes
(from OC Transpo website for stop "Bayview 2A")

15 min intervals (AM)					Peak Hour (AM)				
	total buses	buses out of service	buses out of service (non-indicated)	buses in service			total (veh/hr)	out of service (veh/hr)	in service (veh/hr)
6:30	29	0	0	29	6:30	7:30	114	1	113
6:45	22	0	0	22	6:45	7:45	118	2	116
7:00	27	1	0	26	7:00	8:00	137	2	135
7:15	36	0	0	36	7:15	8:15	147	2	145
7:30	33	1	0	32	7:30	8:30	149	4	145
7:45	41	0	0	41	7:45	8:45	157	12	145
8:00	37	1	0	36	8:00	9:00	147	17	130
8:15	38	2	0	36	8:15	9:15	144	23	121
8:30	41	9	0	32	8:30	9:30	126	24	102
8:45	31	5	0	26	* Peak period highlighted in red.				
9:00	34	7	0	27					
9:15	20	3	0	17					
Total	389		29	360	93% of the buses are in service				

15 min intervals (AM)					Peak Hour (AM)				
	total buses	buses out of service	buses out of service (non-indicated)	buses in service			total (veh/hr)	out of service (veh/hr)	in service (veh/hr)
3:30	24	6	1	17	3:30	4:30	92	25	67
3:45	23	4	0	19	3:45	4:45	94	27	67
4:00	19	5	0	14	4:00	5:00	107	39	68
4:15	26	8	1	17	4:15	5:15	110	41	69
4:30	26	9	0	17	4:30	5:30	113	46	67
4:45	36	15	1	20	4:45	5:45	108	47	61
5:00	22	5	2	15	5:00	6:00	95	36	59
5:15	29	12	2	15	5:15	6:15	99	42	57
5:30	21	9	1	11	5:30	6:30	85	29	56
5:45	23	4	1	18	* Peak period highlighted in red.				
6:00	26	10	3	13					
6:15	15	1	0	14					
Total	290		100	190	66% of the buses are in service				

	AM Peak		PM Peak	
	WB	EB	WB	EB
Total Vehicles / pd	293	389	375	290
In Service / pd	225	360	358	190
Out of service / pd	68	29	17	100
% out of service	23%	7%	5%	34%

OBSERVED TRANSIT OPERATIONS AT: Bayview Station Westbound

15 min intervals (AM)					Peak Hour (AM)				
	total buses	buses out of service	buses out of service (non- indicated)	buses in service			total (veh/hr)	out of service (veh/hr)	in service (veh/hr)
6:30	22	5	0	17	6:30	7:30	92	22	70
6:45	19	4	1	14	6:45	7:45	100	22	78
7:00	32	10	0	22	7:00	8:00	114	25	89
7:15	19	2	0	17	7:15	8:15	105	19	86
7:30	30	5	0	25	7:30	8:30	111	22	89
7:45	33	7	1	25	7:45	8:45	101	23	78
8:00	23	4	0	19	8:00	9:00	94	23	71
8:15	25	4	1	20	8:15	9:15	92	22	70
8:30	20	5	1	14	8:30	9:30	90	24	66
8:45	26	8	0	18	* Peak period highlighted in red.				
9:00	21	3	0	18					
9:15	23	7	0	16					
Total	293		68	225	77% of the buses are in service				

15 min intervals (PM)					Peak Hour (PM)				
	total buses	buses out of service	buses out of service (non- indicated)	buses in service			total (veh/hr)	out of service (veh/hr)	in service (veh/hr)
3:30	37	4	0	33	3:30	4:30	135	10	125
3:45	29	0	1	28	3:45	4:45	138	6	132
4:00	34	4	1	29	4:00	5:00	136	5	131
4:15	35	0	0	35	4:15	5:15	138	0	138
4:30	40	0	0	40	4:30	5:30	135	1	134
4:45	27	0	0	27	4:45	5:45	119	1	118
5:00	36	0	0	36	5:00	6:00	119	1	118
5:15	32	1	0	31	5:15	6:15	107	5	102
5:30	24	0	0	24	5:30	6:30	105	6	99
5:45	27	0	0	27	* Peak period highlighted in red.				
6:00	24	4	0	20					
6:15	30	2	0	28					
Total	375		17	358	95% of the buses are in service				

	AM Peak		PM Peak	
	EB	WB	EB	WB
Total Vehicles / pd	389	293	290	375
In Service / pd	360	225	190	358
Out of service / pd	29	68	100	17
% out of service	7%	23%	34%	5%

Bayview Station Westbound - In Service Routes
(from OC Transpo website for stop "Bayview 1A")

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Basod on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking

03/10/2011

AM PEAK HOUR

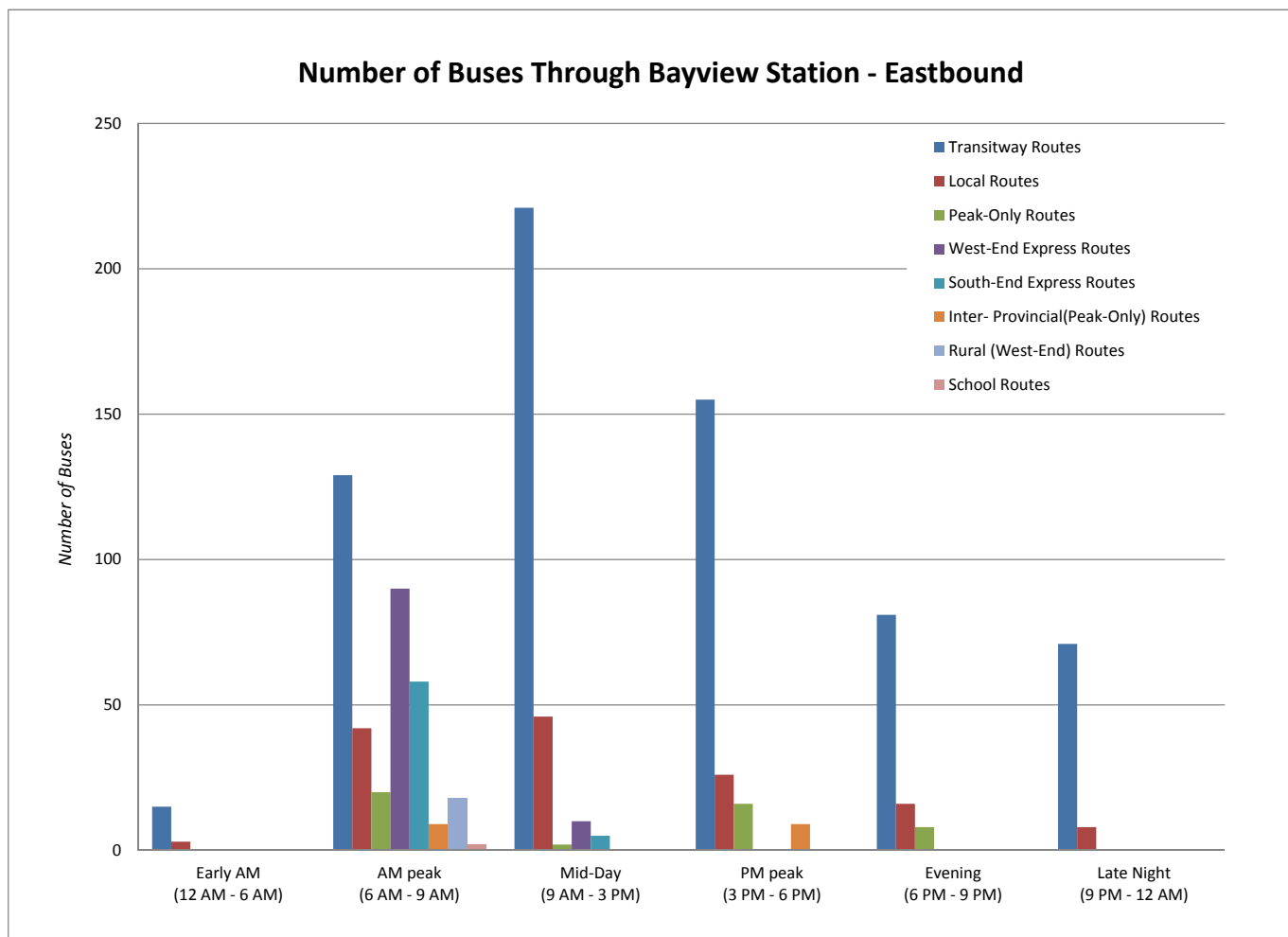
EASTBOUND	EXPECTED Direction	(Multiple Items) EBND	<i>AM Peak Hour: 7:45 - 8:45 AM</i> <i>EBND</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	BAR Express	31	18	84	
	KNT Express and Rural-West	41	20	141	
	Local	20	17	21	
	Peak	10	3	6	
	Peak-Interprovincial	4	12	0	
	Transitway	60	65	169	
	Grand Total	166	135	421	

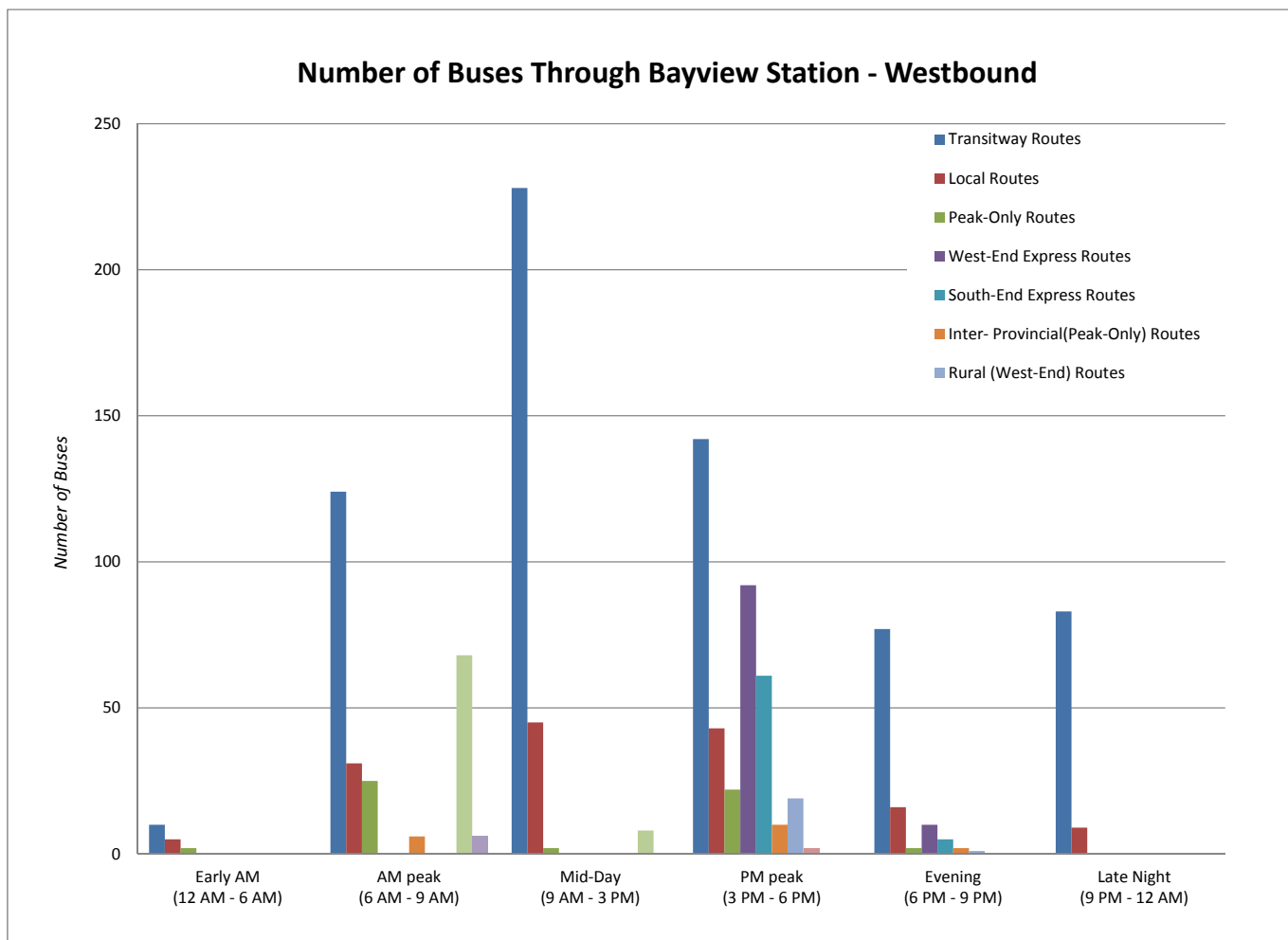
WESTBOUND	EXPECTED Direction	(Multiple Items) WBND	<i>AM Peak Hour: 7:00 - 8:00 AM</i> <i>WBND</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Local	12	11	3	
	ORL Express and Rural-East	38	2	5	
	Peak	11	17	2	
	Peak-Interprovincial	3	3	10	
	Transitway	48	59	27	
	Grand Total	112	92	47	

PM PEAK HOUR

EASTBOUND	EXPECTED Direction	(Multiple Items) EBND	PM Peak Hour: 4:30 - 5:30 PM EBND		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Local	9	5	8	
	Peak	7	1	10	
	Peak-Interprovincial	4	5	1	
	Transitway	56	77	109	
	Grand Total	76	88	128	

WESTBOUND	EXPECTED Direction	(Multiple Items) WBND	PM Peak Hour: 4:15 - 5:15 PM WBND		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	BAR Express	29	42	6	
	KNT Express and Rural-West	47	93	13	
	Local	16	25	16	
	Peak	8	6	1	
	Peak-Interprovincial	4	2	34	
	Transitway	53	125	88	
	Grand Total	157	293	158	





Basod on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking

AM PEAK HOUR

NORTHBOUND/ SOUTHBOUND	EXPECTED	(Multiple Items)	<i>AM Peak Hour: 7:30 AM - 8:30 AM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Interprovincial	5	80	7	
	Peak-Interprovincial	20	170	3	
	Grand Total	25	250	10	

EASTBOUND	EXPECTED	(Multiple Items)	<i>AM Peak Hour : 7:30 AM - 8:30 AM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	BAR Express	42	2	142	
	Interprovincial	4	14	8	
	KNT Express and Rural-West	68	14	163	
	Local	21	12	48	
	ORL Express and Rural-East	6	0	15	
	Peak	10	3	72	
	Peak-Interprovincial	7	0	24	
	Transitway	56	82	226	
	Grand Total	214	127	698	

WESTBOUND	EXPECTED	(Multiple Items)	<i>AM Peak Hour : 7:45 AM - 8:45 AM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Local	30	28	26	
	ORL Express and Rural-East	66	12	56	
	Peak	10	35	6	
	Peak-Interprovincial	4	0	13	
	Transitway	59	95	47	
	Grand Total	169	170	148	

INTERPROV (All Directions)	Interprovincial	5	80	7	
	Peak-Interprovincial	20	170	3	
	Interprovincial	4	14	8	
	Peak-Interprovincial	7	0	24	
	Peak-Interprovincial	4	0	13	
			264	55	

Basod on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking

PM PEAK HOUR

NORTHBOUND/ SOUTHBOUND	EXPECTED	(Multiple Items)	<i>PM Peak Hour: 3:45 PM - 4:45 PM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Interprovincial	5	23	1	
	Peak-Interprovincial	3	2	2	
	Grand Total	8	25	3	

EASTBOUND	EXPECTED	(Multiple Items)	<i>PM Peak Hour : 3:45 PM - 4:45 PM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	Interprovincial	5	1	5	
	Local	29	33	18	
	ORL Express and Rural-East	60	151	0	
	Peak	11	2	45	
	Peak-Interprovincial	5	4	52	
	Transitway	59	104	100	
	Grand Total	169	295	220	

WESTBOUND	EXPECTED	(Multiple Items)	<i>PM Peak Hour : 4:00 PM - 5:00 PM</i>		
	Row Labels	Count of RUN	Sum of ONS	Sum of OFFS	
	BAR Express	31	79	4	
	KNT Express and Rural-West	44	95	9	
	Local	17	39	8	
	Peak	9	21	0	
	Peak-Interprovincial	16	2	433	
	Transitway	54	176	47	
	Grand Total	171	412	501	

INTERPROV (All Directions)	Interprovincial	5	23	1	
	Peak-Interprovincial	3	2	2	
	Interprovincial	5	1	5	
	Peak-Interprovincial	5	4	52	
	Peak-Interprovincial	16	2	433	
			32	493	

TRANSIT ACTIVITY BY PERIOD

EASTBOUND

period	type	Sum of ONS	Sum of OFFS
AM peak		223	1411
	BAR Express	7	264
	Interprovincial	16	10
	KNT Express and Rural-West	27	366
	Local	29	108
	ORL Express and Rural-East	0	32
	Peak	4	123
	Peak-Interprovincial	0	58
	Transitway	140	450
Early AM		6	8
	Interprovincial		
	Local	0	1
	Transitway	6	7
evening		83	122
	Interprovincial	5	36
	Local	8	8
	ORL Express and Rural-East	20	0
	Peak	4	7
	Transitway	46	71
late night		25	68
	Interprovincial	3	5
	Local	2	3
	Transitway	20	60
midday		191	437
	BAR Express	2	17
	Interprovincial	16	94
	KNT Express and Rural-West	3	16
	Local	20	49
	ORL Express and Rural-East	0	5
	Peak	2	5
	Peak-Interprovincial	1	5
	Transitway	147	246
PM peak		727	523
	Interprovincial	8	22
	Local	88	40
	ORL Express and Rural-East	324	0
	Peak	13	90
	Peak-Interprovincial	20	81
	Transitway	274	290
Grand Total		1255	2569

Basod on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking**TRANSIT ACTIVITY BY PERIOD****WESTBOUND**

period	type	Sum of ONS	Sum of OFFS
AM peak		358	312
	Local	54	50
	ORL Express and Rural-Ea	31	130
	Peak	85	17
	Peak-Interprovincial	2	19
	Transitway	186	96
Early AM		15	4
	Local	5	0
	Peak	2	1
	Transitway	8	3
evening		94	72
	BAR Express	5	1
	KNT Express and Rural-W	11	0
	Local	4	1
	Peak	1	0
	Peak-Interprovincial	1	36
	Transitway	72	34
late night		71	44
	Local	1	0
	Transitway	70	44
midday		331	132
	Local	27	13
	ORL Express and Rural-Ea	5	14
	Peak	8	0
	Transitway	291	105
PM peak		940	1072
	BAR Express	149	8
	KNT Express and Rural-W	249	17
	Local	79	19
	Peak	52	4
	Peak-Interprovincial	10	895
	Transitway	401	129
Grand Total		1809	1636

NORTHBOUND

period	type	Sum of ONS	Sum of OFFS
AM peak		491	17
	Interprovincial	123	10
	Peak-Interprovincial	368	7
evening		33	6
	Interprovincial	33	6
late night		13	1
	Interprovincial	13	1
midday		155	15
	Interprovincial	95	12
	Peak-Interprovincial	60	3
PM peak		57	9
	Peak	7	2
	Interprovincial	48	5
	Peak-Interprovincial	2	2
Grand Total		749	48

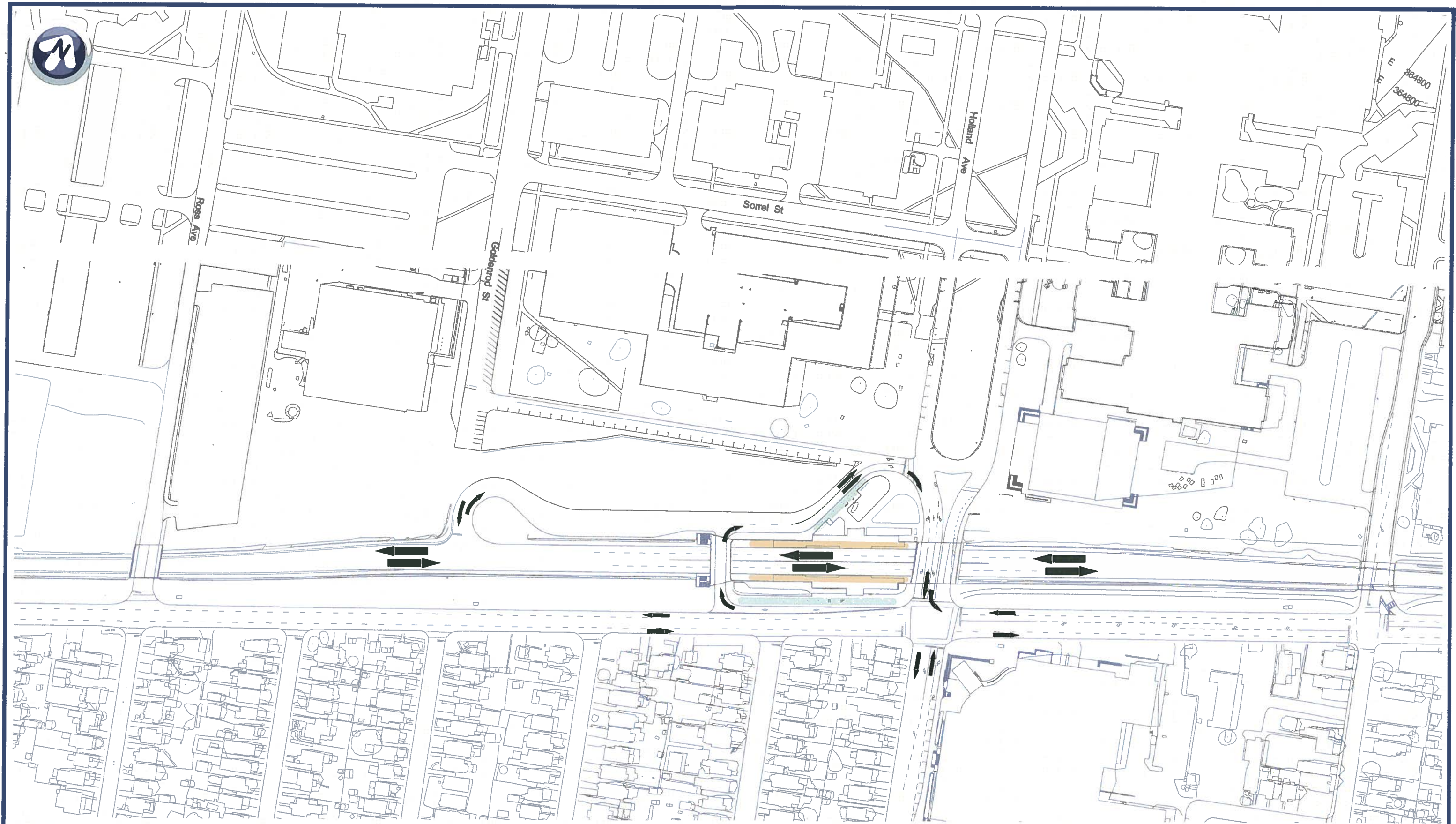
Basod on: OC Transpo Automatic Passenger
Count Information, September 2010 Booking

Route	Type	Area	Terminus
6	Local	Tunney's P	Downtown
8	Interprovincial	gatineau	billings bridge
16	Local		
18	Local		
20	ORL Express and Rural-East	Orleans	Lebreton
21	ORL Express and Rural-East	Orleans	
22	ORL Express and Rural-East	Orleans	
23	ORL Express and Rural-East	Blackburn	
24	ORL Express and Rural-East	East Ottawa	
27	ORL Express and Rural-East	Gatineau	
31	ORL Express and Rural-East	Orleans	
32	ORL Express and Rural-East	Orleans	
33	ORL Express and Rural-East	Orleans	
34	ORL Express and Rural-East	Orleans	
35	ORL Express and Rural-East	Orleans	
37	ORL Express and Rural-East	Orleans	
38	ORL Express and Rural-East	Orleans	
39	ORL Express and Rural-East	Orleans	
40	Peak-Interprovincial	Gatineau	Gloucester South
43	Peak	South Ottawa	
57	Peak	Fisher	
60	KNT Express and Rural-West	Kanata	
61	KNT Express and Rural-West	Kanata	
62	KNT Express and Rural-West	Kanata	
63	KNT Express and Rural-West	Kanata	
64	KNT Express and Rural-West	Kanata	
65	KNT Express and Rural-West	Kanata	
66	KNT Express and Rural-West	Kanata	
67	KNT Express and Rural-West	Greenbank	
68	KNT Express and Rural-West	Kanata	
69	KNT Express and Rural-West	Bells Corners	
70	BAR Express	Barrhaven	
71	BAR Express	Barrhaven	
73	BAR Express	Barrhaven	
76	BAR Express	Barrhaven	
77	BAR Express	Barrhaven	
82	Peak	Walkley	
86	Local	Meadowlands / Fisher	
87	Local	Mooney's Bay / Uplands	
88	Peak-Interprovincial	Gatneau	South Keys
94	Transitway		
95	Transitway		
96	Transitway		
97	Transitway		
98	Transitway		
99	Local	Greenboro Riverview	
102	Peak	Tunney's P	Orleans
105	Peak-Interprovincial	Gatineau	Tunney's Pasture
150	Peak	Churchill/	Lebreton
151	Local	Tunney's P	Carling
153	Local	Somerset	Lebreton
155	Peak	Holland/Central Park/Baseline	
176	Local	Merivale	
182	Peak	Kanata North	
195	Peak	Barrhaven	
221	ORL Express and Rural-East	east	
231	ORL Express and Rural-East	east	
232	ORL Express and Rural-East	east	
261	KNT Express and Rural-West	west	
262	KNT Express and Rural-West	west	
263	KNT Express and Rural-West	west	
283	KNT Express and Rural-West	west	
603	Local	School	
693	Local	School	

APPENDIX B

Tunney's Pasture Temporary Station Bus Access and Circulation

(Capital Transit Partners Plan, September 2011)



Date: September 2011

Scale: 1:2000

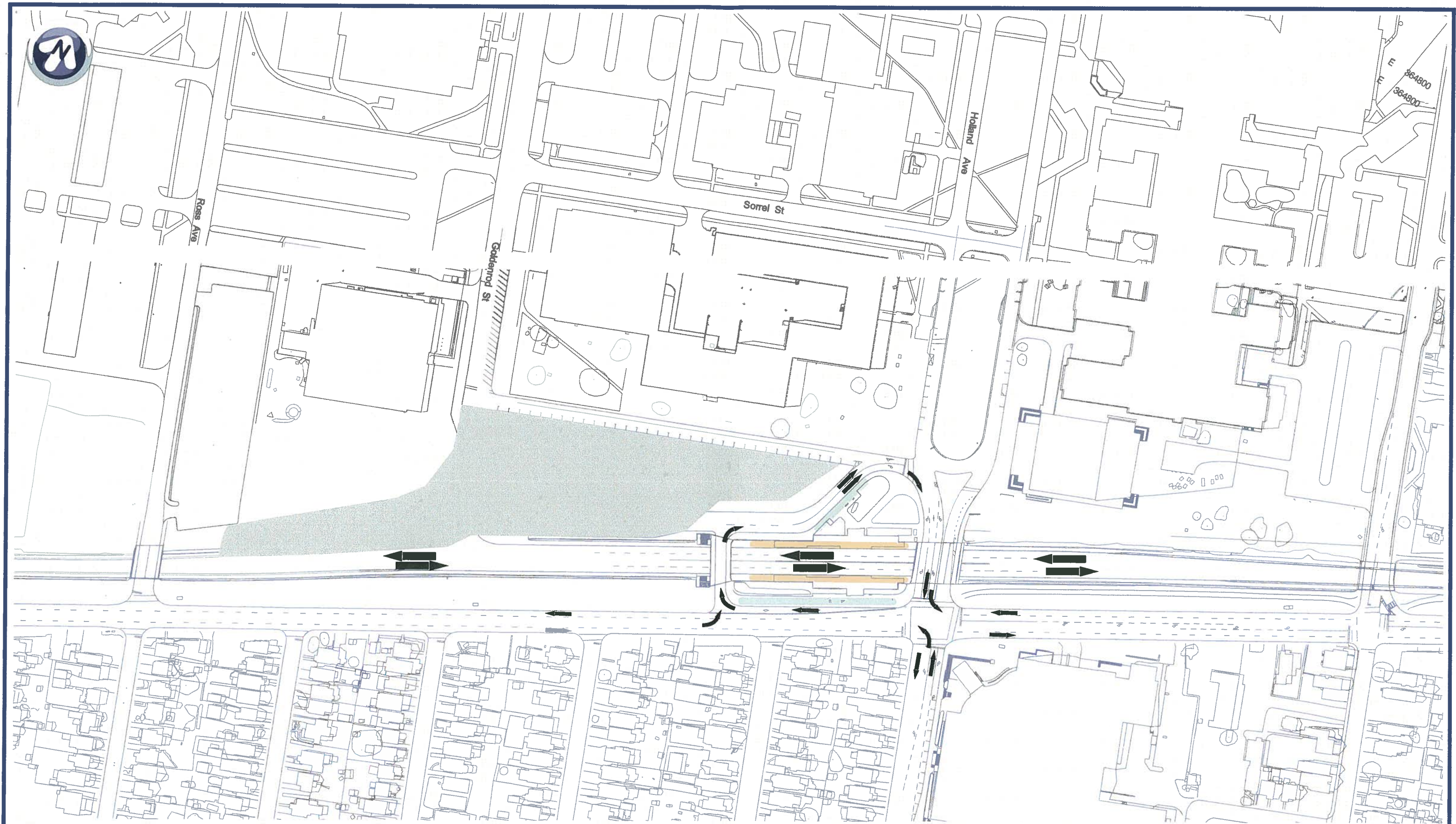
LEGEND

- Under construction
- Primary Bus Circulation
- Secondary Bus Circulation
- Upper Level Platform(s) in use
- Lower Level Platform(s) in use

Tunneys Pasture Station Bus Access and Circulation Existing Conditions








EXHIBIT 4.1.1



Date: August 2011

Scale: 1:2000

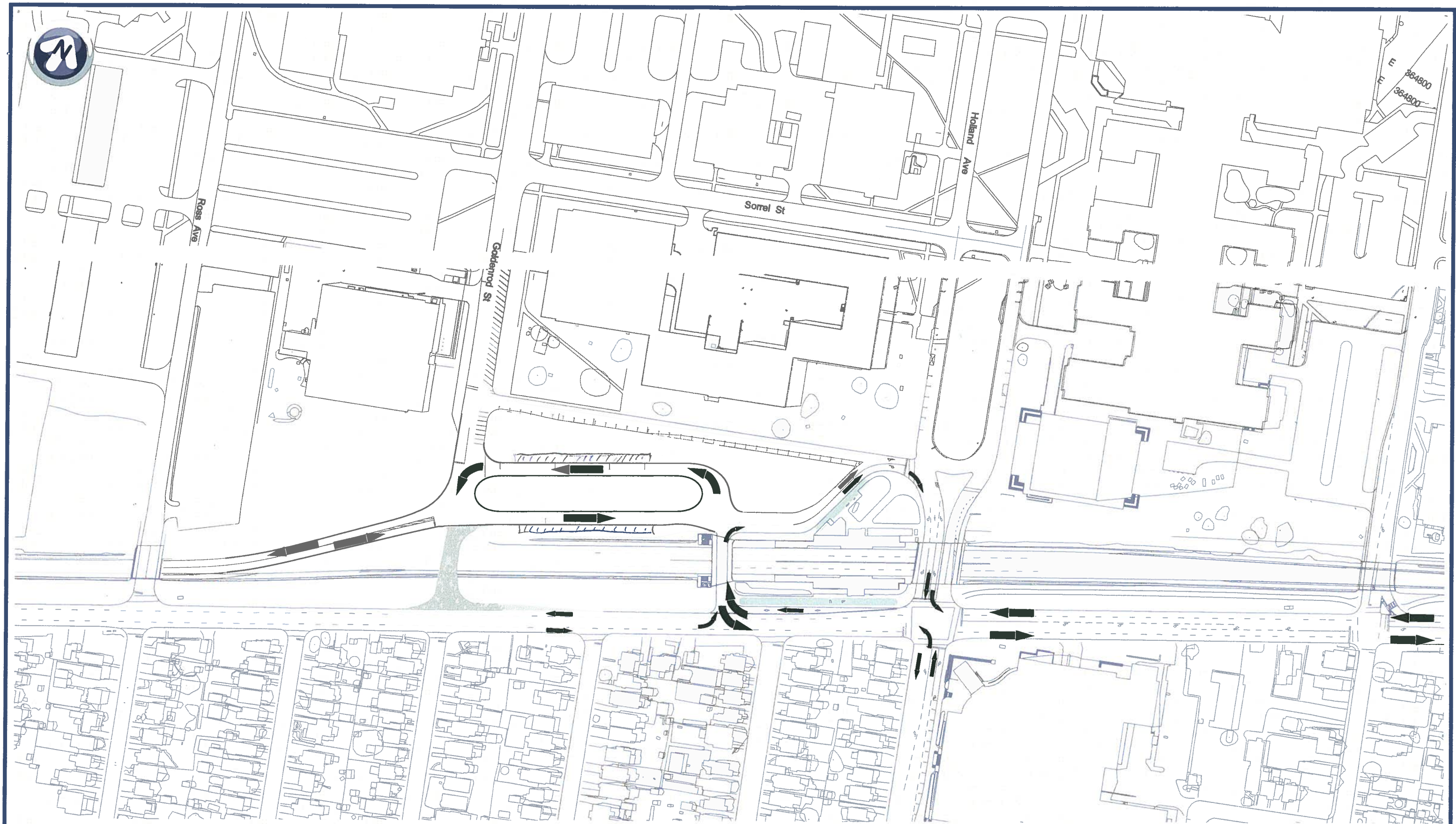
LEGEND

-  Under construction
-  Primary Bus Circulation
-  Secondary Bus Circulation
-  Upper Level Platform(s) in use
-  Lower Level Platform(s) in use

Tunneys Pasture Station Bus Access and Circulation Construction Stage 1



EXHIBIT 4.1.2



Date: August 2011

Scale: 1:2000

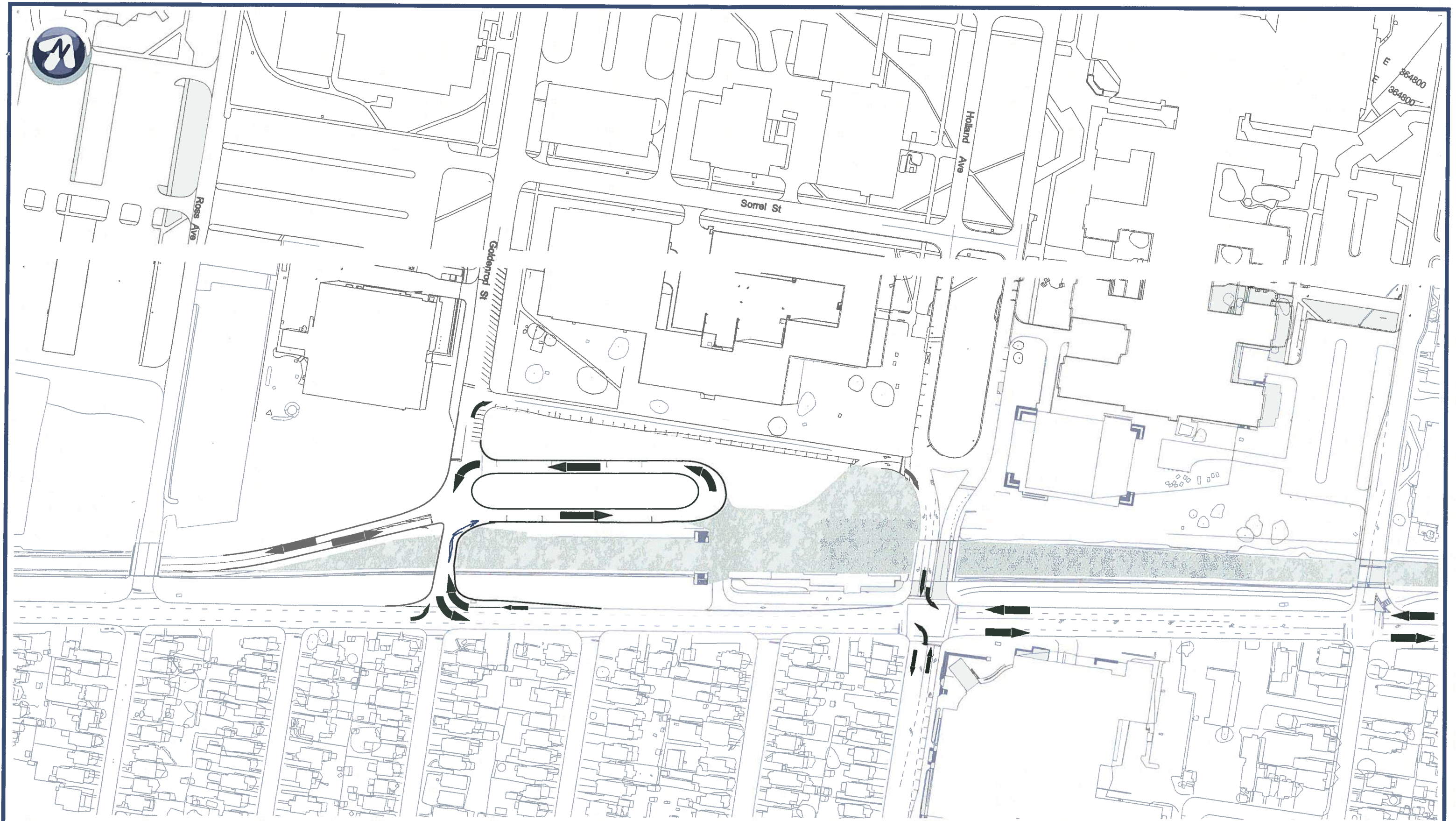
LEGEND

- Under construction
- Primary Bus Circulation
- Secondary Bus Circulation
- Upper Level Platform(s) in use
- Lower Level Platform(s) in use

Tunneys Pasture Station Bus Access and Circulation Construction Stage 2




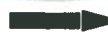



EXHIBIT 4.1.3



Date: August 2011

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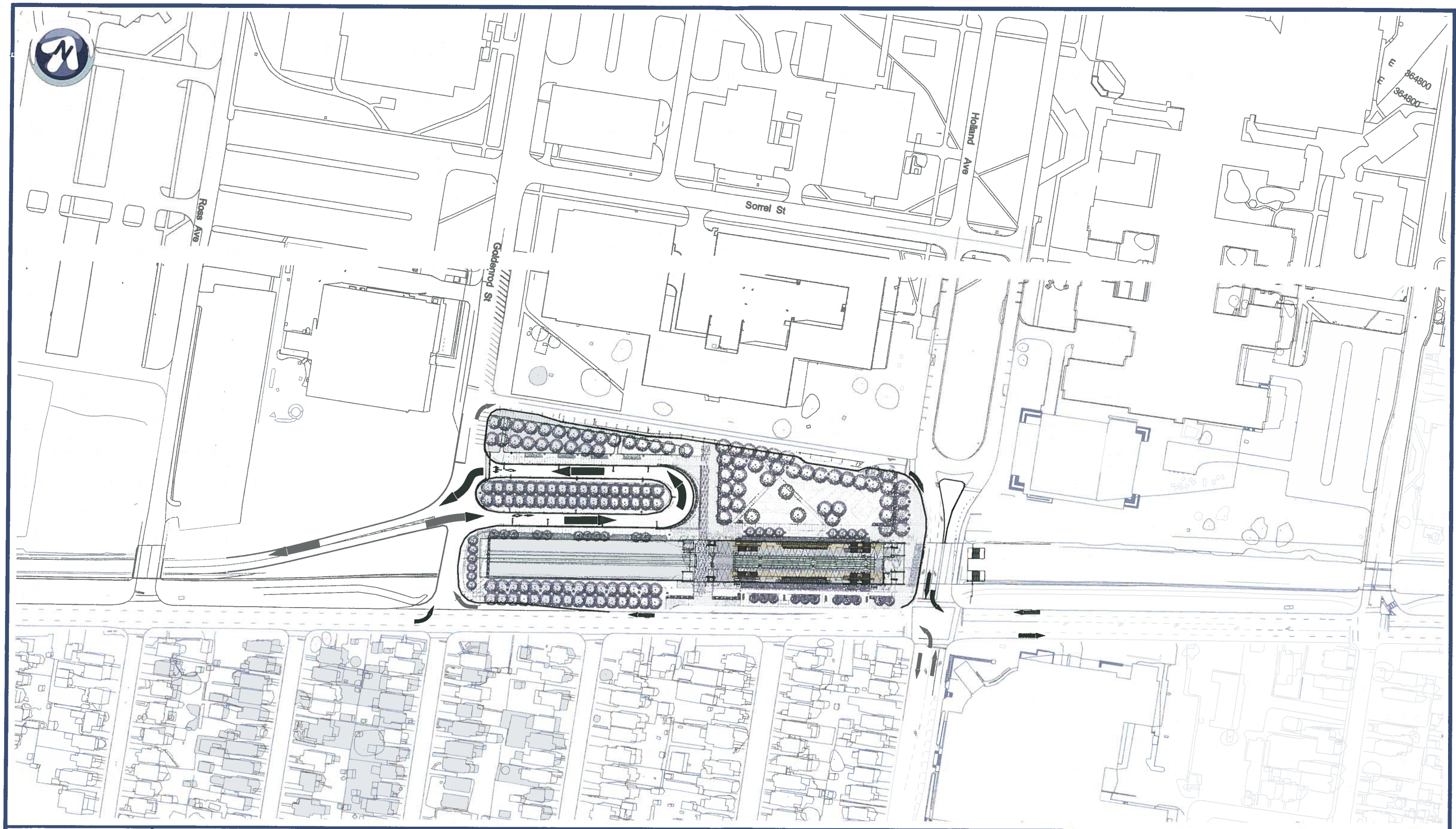
LEGEND

-  Under construction
-  Primary Bus Circulation
-  Secondary Bus Circulation
-  Upper Level Platform(s) in use
-  Lower Level Platform(s) in use

Tunneys Pasture Station Bus Access and Circulation Construction Stage 3








EXHIBIT 4.1.4



Date: August 2011

Scale: 1:2000

LEGEND

-  Under construction
-  Primary Bus Circulation
-  Secondary Bus Circulation
-  Upper Level Platform(s) in use
-  Lower Level Platform(s) in use

Tunneys Pasture Station Bus Access And Circulation Upon Completion



EXHIBIT 4.1.5

APPENDIX C

Traffic Analysis



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OUR FILE: 3411022
PREPARED BY: Meghan Whitehead
DATE: September 30, 2011
SUBJECT: Traffic Analysis

1.0 INTRODUCTION

The two primary corridors selected as possibilities for the OLRT construction transit detours in the west are the Ottawa River Parkway and Scott Street. A detailed traffic analysis was undertaken to identify and compare the impacts on traffic and transit operations for various detour scenarios which includes various service combinations using these two corridors. The assessment considered the following; all transit services provided with a single corridor, splitting the Express and Transitway service between the two corridors, and transit operations in dedicated bus lanes and within mixed use traffic.

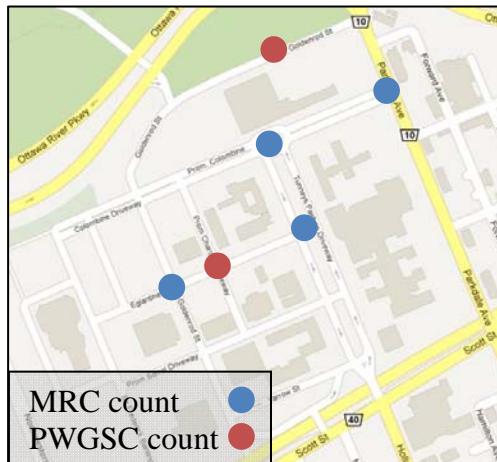
2.0 EXISTING DATA AND CONDITIONS ASSESSMENT

The existing conditions were assessed to set the basis to develop alternatives for transit service detours, to serve as a baseline for comparison of alternatives and to identify and assess the impacts of future transit detour scenarios developed within the analysis.

2.1 Data Collection Process

Traffic volumes and signal timing plans at all major intersections along the Ottawa River Parkway/Wellington Street, Scott Street, and Parkdale Avenue were provided by the City of Ottawa. Some additional traffic counts for the Tunney's Pasture Campus were provided by Public Works and Government Service Canada (PWGSC), at two locations and consequently MRC initiated traffic counts at four additional locations. Traffic count locations for the Tunney's Pasture Campus are shown in Figure 1.

Figure 1: Traffic Count Locations



In addition MRC initiated auto travel time runs between June 14th and June 16th, 2011 to identify the existing travel times along the Ottawa River Parkway and Scott Street corridors. The surveys were conducted using GPS units which recorded the time, vehicle location and vehicle speed at five second intervals. The number of independent runs varied between 23-36 along each of the identified routes during the peak periods of 7:00 – 9:30 AM and 3:00 – 5:30 PM. The methodology for these data collection efforts and the results obtained are further described in Section 2.4.

2.2 Existing Traffic Volumes

Both the Ottawa River Parkway and Scott Street corridors function as four lane arterial roads within the study area. The peak hour traffic volumes on the Ottawa River Parkway are as high as 1,900 – 2,100 vph in the peak direction while the peak hour traffic volumes on Scott Street are significantly lower with 800 - 850 vph in the peak direction. Both the AM and PM peak hour traffic volumes are summarised in Figure 2

2.3 Existing Level of Service

The performance of area intersections were assessed through the application of widely accepted intersection traffic modeling software known as Synchro. The intersection operations are described by an overall intersection Level of Service (LOS) based on the intersection's reported volume to capacity ratio as described in the City of Ottawa's Transportation Impact Assessment (TIA) Guidelines.

Ottawa River Parkway: Based on the existing traffic volumes and signal timings, the intersections along the Ottawa River Parkway are, for the most part, currently operating at a LOS 'E' during the PM peak hour. In the AM peak the intersections are operating at a LOS 'C' or better with the exception of Booth Street, Portage Bridge and Island Park Drive which are operating at a LOS 'D' or 'E'. With overall intersection operations approaching capacity (LOS 'D' or 'E'), several movements at these intersections have already reached capacity which results in growing queues as the intersection fails to meet the demand. The movements that are currently operating with a volume to capacity ratio of 0.95 or higher are shown in Table 1.

Table 1: Existing Critical Movements on the Ottawa River Parkway

Intersection	AM PEAK HOUR	PM PEAK HOUR
Portage Bridge	Eastbound Left Westbound Through Southbound Left	Eastbound Left Westbound Right Southbound Left
Booth Street	Eastbound	Westbound Northbound
Island Park Drive	Eastbound Through Northbound Through Southbound Through	Eastbound Left Northbound Through
Tunney's Pasture	N/A	Westbound

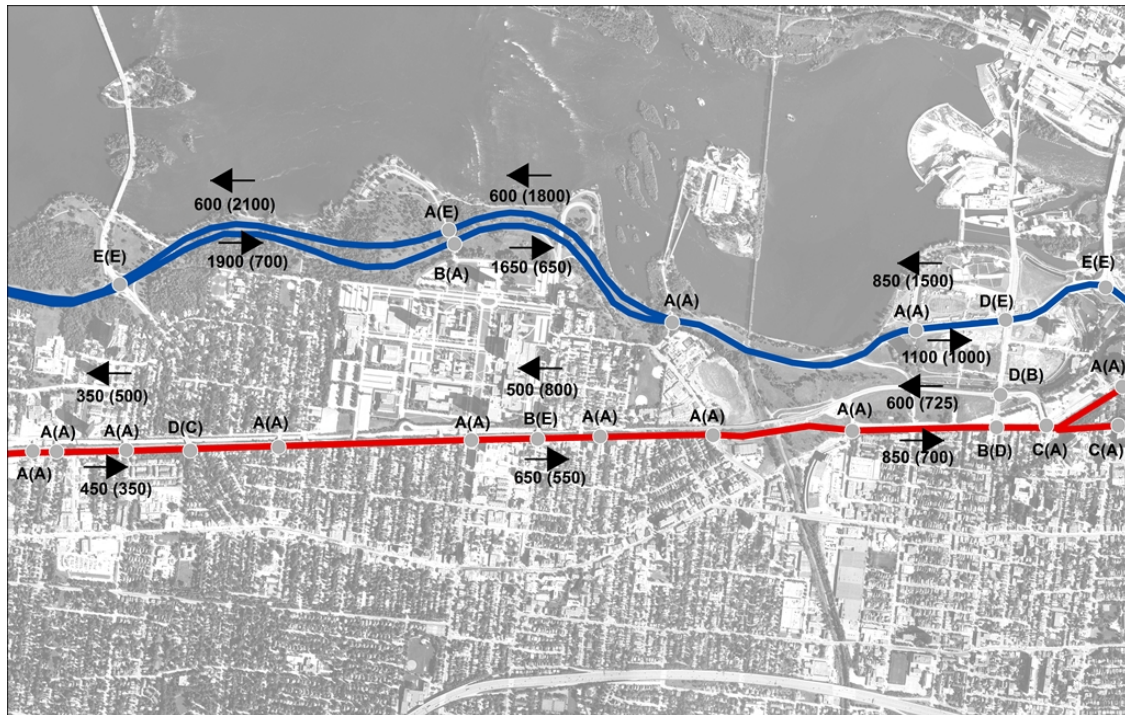
Scott Street: The intersections along Scott Street are generally operating at an acceptable LOS during the peak hours (LOS 'C' or better) with three exceptions. These Scott Street intersections are; Island Park Drive which is a LOS 'D' in the morning peak, Parkdale Avenue with a reported LOS 'E' in the PM peak and Booth Street at a LOS 'D' in the PM peak. The movements which are currently operating at or near capacity are summarised in Table 2.

Table 2: Existing Critical Movements on Scott Street

Intersection	AM PEAK HOUR	PM PEAK HOUR
Booth Street	N/A	Eastbound Left Westbound Through
Parkdale Avenue	N/A	Westbound Northbound
Island Park Drive	Southbound Through	Eastbound Left

The typical peak hour traffic link volumes along the Ottawa River Parkway and Scott Street as well as the reported intersection level of service with in each of the corridors are summarised in Figure 2.

Figure 2: Existing AM (PM) Peak Hour Traffic Operations



2.4 Existing Travel Time Runs

2.4.1 Methodology

The travel time data collected along the both Ottawa River Parkway and Scott Street corridors has been tabulated based on the total travel time for the following two roadway segments; Churchill to Bronson and; Holland to Bronson. This provided a comparison of the performance of each corridor under existing conditions and an indication of the degree of traffic congestion during the peak hour when compared with the overall peak period. In addition to the total travel time, the locations where vehicles were moving at travel speeds of 20km/h or less were highlighted for both corridors to identify the locations of significant congestion.

2.4.2 Travel Time Run & Queue Results

A comparison of the travel time runs for the morning peak indicate that both corridors share similar travel times with the exception of the Ottawa River Parkway, where eastbound traffic during the morning peak between 7:45 and 8:45, experienced a much higher travel time as shown in along the Ottawa River Parkway. The main congestion on the Ottawa River Parkway traveling eastbound in the morning peak is caused by downstream congestion closer to and in downtown with queues backing up as far as Vimy Place. For Scott Street corridor, the delay for eastbound traffic in the morning peak period is predominately located in the vicinity of the Booth Street and Empress Street intersections.

Figure 3. The average travel time in the peak direction for the Ottawa River Parkway and Scott Street were found to be 9 minutes and 7 minutes-45 seconds for the eastbound AM and westbound PM, respectively.

As indicated, the locations where vehicles were moving at 20 km/h or less were identified to specifically locate areas of significant congestion. This is illustrated in Figure 4 for Scott Street and Figure 5 along the Ottawa River Parkway. The main congestion on the Ottawa River Parkway traveling eastbound in the morning peak is caused by downstream congestion closer to and in downtown with queues backing up as far as Vimy Place. For Scott Street corridor, the delay for eastbound traffic in the morning peak period is predominately located in the vicinity of the Booth Street and Empress Street intersections.

Figure 3: AM Peak Period Travel Times - Churchill Avenue to Bronson Avenue

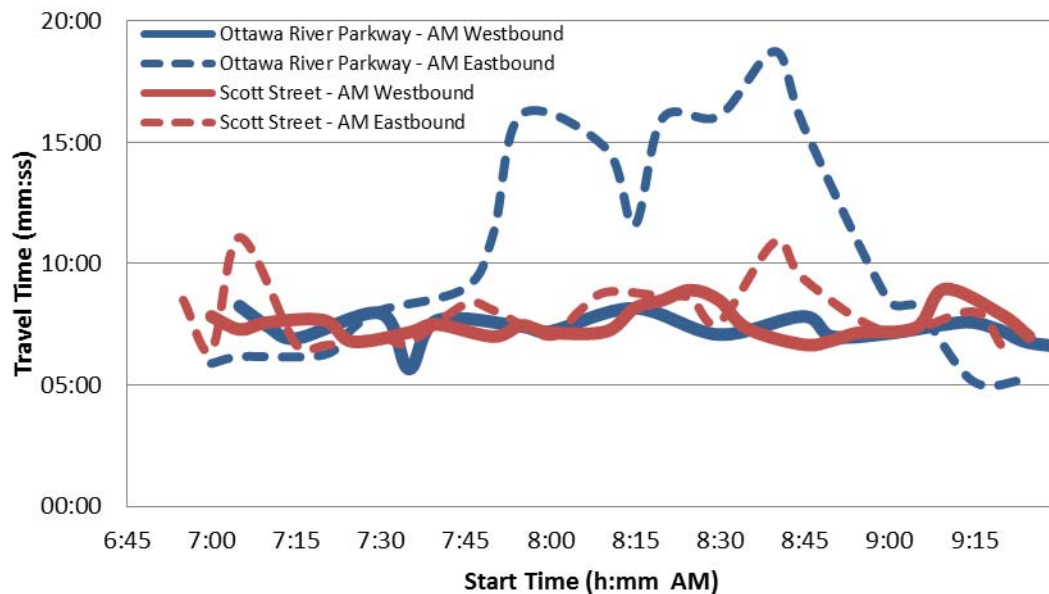


Figure 4: Queues on Scott Street Eastbound during the AM Peak Period



Figure 5: Queues on the Ottawa River Parkway Eastbound during the AM Peak Period



During the PM peak hour, the Ottawa River Parkway has the largest travel times however, throughout the afternoon peak period, Scott Street also experiences slow moving traffic as shown in Figure 6.

The main congestion along the Ottawa River Parkway in the afternoon peak direction is caused by traffic leaving Tunney's Pasture and the delay experienced at the intersection of Island Park Drive, shown in Figure 8.

The Scott Street corridor has two primary areas of congestion during the afternoon peak. The first is the Booth Street intersection which creates queues which can spill back as far as Bronson Avenue and the second is the Island Park Drive intersection with queues extending to Northwestern Avenue. The queues for Scott Street are shown in Figure 7.

Figure 6: Chart Showing PM Peak Period Travel Times – Churchill Avenue to Bronson Avenue

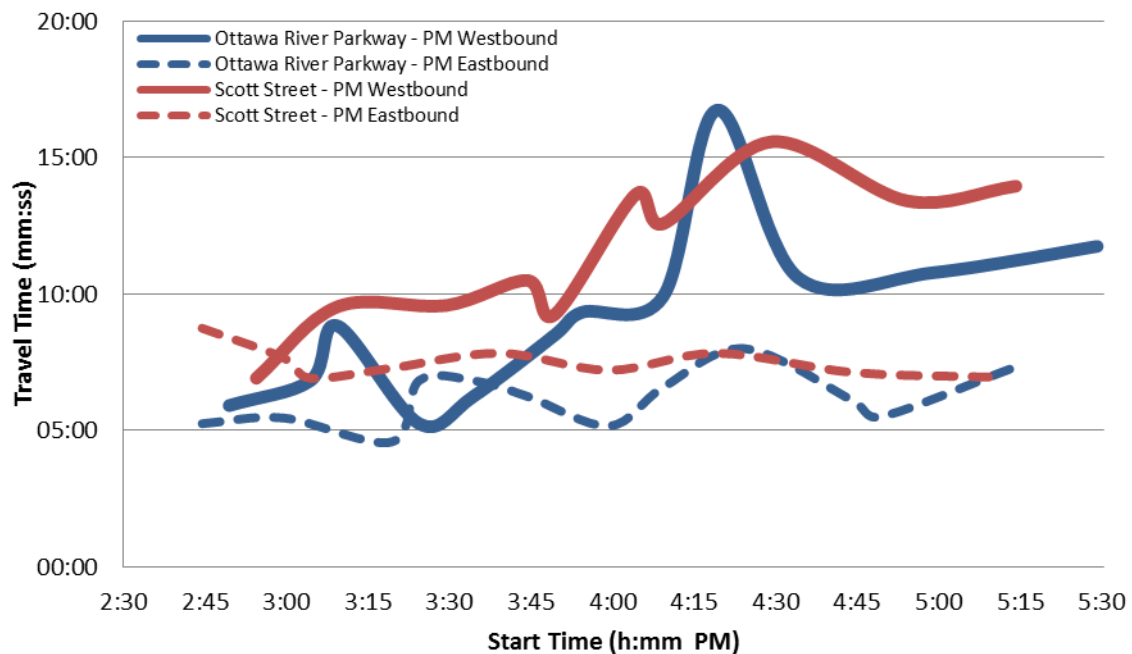


Figure 7: Map Showing Queues on Scott Street Westbound during the PM Peak Period

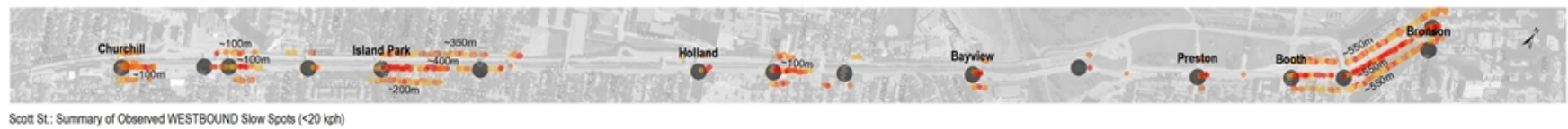


Figure 8: Map Showing Queues on the Ottawa River Parkway Westbound during the PM Peak Period



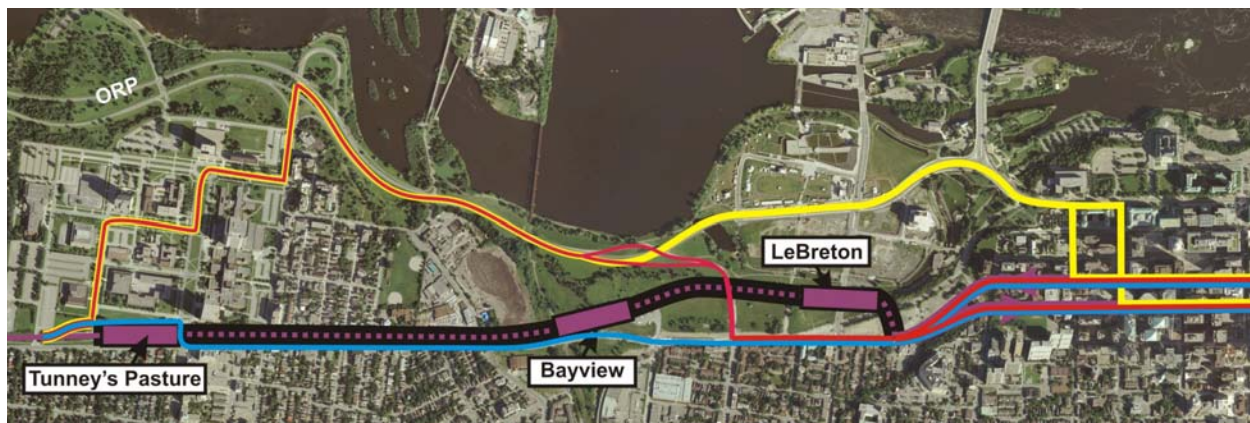
3.0 CORRIDOR OPTIONS FOR DETOUR

Corridor options have been developed to detour transit operations off the Transitway during construction of the OLRT and involves the section of Transitway between Tunney's Pasture and the downtown. The detour options considered both transit routing, servicing alternatives and included the potential for having designated transit lanes. Three route options were established using all or sections of Scott Street and the Ottawa River Parkway. Each route option was analysed with all Transitway and Express service in the same corridor as well as with the service split between two of the corridor options. Operating transit service in dedicated transit lanes and/or general purpose traffic was also considered and analyzed. A description of the route options, including sub-options within each, and the associated analysis is contained within the following sections.

3.1 Routing Options

As indicated, three corridor route options were selected for analysis, shown in Figure 9. The first option (shown in blue) is a route along Scott Street from Tunney's Pasture Station to downtown. The second option (shown in pink) travels through Tunney's Pasture to the Ottawa River Parkway and returns to Scott Street via the Preston Street ramps. The third option (shown in yellow) travels through Tunney's Pasture and follows the Ottawa River Parkway/Wellington Street into downtown and connects to the Transitway via Lyon Street/Bay Street. The existing Transitway and stations are shown in black and purple.

Figure 9: Alternative Corridors for the OLRT West Transit Detours



Consideration was given to providing all Transitway and Express Services on one route as well as splitting these services between Scott Street and the Ottawa River Parkway. The Transitway Service currently stops at Bayview and LeBreton Stations while the Express Service has no stops between Tunney's Pasture and downtown. If the service was split between two routes, it would be preferable to have the Transitway Service on Scott Street to service all stations and therefore have the Express Service on the Ottawa River Parkway. For the purposes of this analysis, whenever the service was split between two routes, it was assumed that Scott Street would carry the Transitway Service and the Ottawa River Parkway would carry the Express Service.

3.2 Option 1: Scott Street

In Option 1, Scott Street, the transition from the existing Transitway to the Scott Street corridor would be via a new transit-only extension of Goldenrod Street with a new

signalized intersection on Scott Street. Transit service would be able to continue to service Transitway Stations in this section at the existing Tunney's Pasture Station as well as new stations developed in the Scott Street corridor at Bayview and LeBreton to maintain the existing service. The option of running only Transitway service or Transitway and Express service was considered for this corridor. It was assumed that service on Scott Street would be in dedicated bus lanes. The conceptual bus lane design proposed by CTP as part of the LRT preliminary design work was used for the initial analysis in the Scott Street corridor. A copy of the CTP conceptual plan is included in Appendix F.

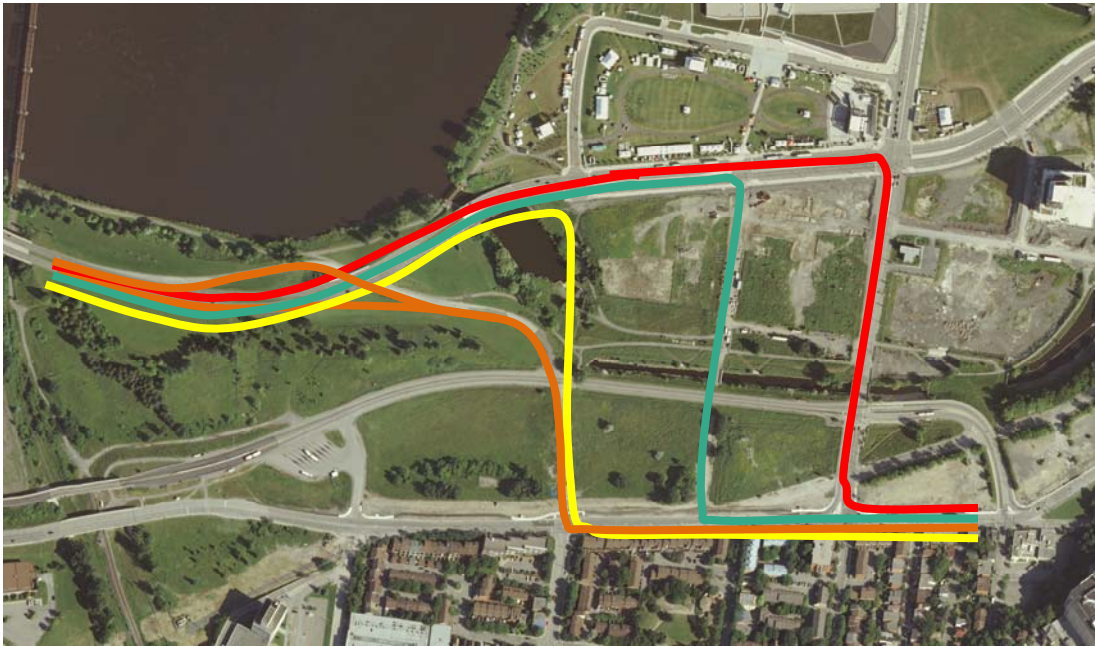
3.3 Option 2: Ottawa River Parkway / Scott Street

Option 2 uses both the Ottawa River Parkway and Scott Street corridors. Transit vehicles would access/exit the Ottawa River Parkway at Tunney's Pasture (see discussion on sub-options in Section 3.5), travel on the Ottawa River Parkway between Tunney's Pasture and the Preston Street ramps and then travel on Scott Street to the existing Central Transitway. Transit would maintain service to the existing Tunney's Pasture Station and LeBreton Station (relocated to Scott Street) but would by-pass the Bayview Station including access to the O-Train. For this reason, Scott Street is a preferred route from a transit operations perspective. Nonetheless, Option 2 was evaluated considering all Transit Service or just Express Service in dedicated transit lanes or general traffic.

3.3.1 Sub-Options Connecting Ottawa River Parkway to Scott Street

At the east end of the corridor, there were a number of potential options available to connect the ORP to Scott Street which are shown in Figure 10. They include the use of the Preston Street ramps (shown in orange), Broad Street (shown in green), Preston Street (shown in yellow) or Booth Street (shown in red). The analysis used the Preston Street transit ramps, however it is noted that using the Preston Street transit ramps; Broad Street, Preston Street, or Booth Street could be considered as alternative routes and would be expected to operate reasonably similar to the route analyzed along the Preston Street ramps.

Figure 10: Possible Routing Options from Ottawa River Parkway to Downtown



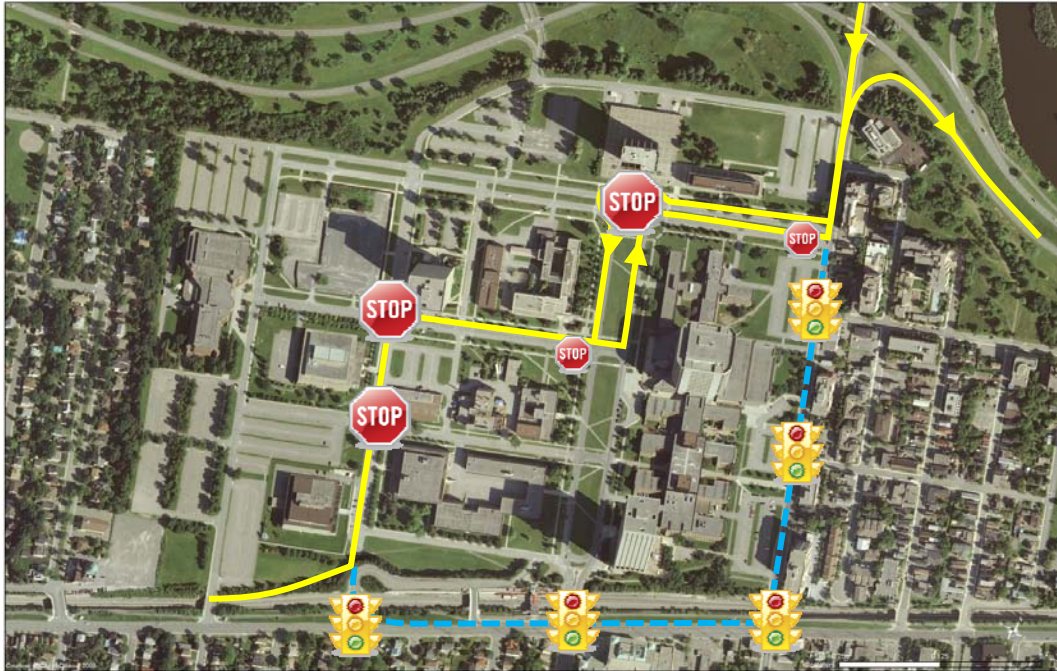
3.4 Option 3: Ottawa River Parkway

The Ottawa River Parkway, Option 3, also had transit vehicles accessing/exiting the Ottawa River Parkway at Tunney's Pasture and then continuing along the Ottawa River Parkway to Wellington Street and accessing the Central Transitway via Lyon/Bay Streets. Transit service in this corridor would not service Bayview or LeBreton Stations. As with Option 2, operating all Transit Services or just Express Service were considered for Option 3, with additional analysis carried out to determine the differences between operating in dedicated bus lanes or general traffic.

3.5 Sub-Options at Tunney's Pasture

For Options 2 and 3 using the Ottawa River Parkway, two options were considered to access the Ottawa River Parkway from the Tunney's Pasture Station, as shown in Figure 11. The first route was on Scott Street, via the new transit-only connection at Goldenrod, with a left turn at Parkdale Avenue to access the ramps at the Ottawa River Parkway and Parkdale Avenue. The second travelled through the Tunney's Pasture campus and is shown in yellow in Figure 11.

Figure 11: Possible Routing Options from Tunney's Pasture Station to the Ottawa River Parkway



An analysis was carried out in the traffic modeling software Synchro to assess the differences in travel time for the two sub-options as described above. The results are summarized in Table 3. It was assumed that transit vehicles traveling through the Tunney's Pasture Campus and on Parkdale Avenue would operate in mixed traffic as the roads are primarily a single lane in each direction.

As can be seen in Table 3, the travel time through the Tunney's Pasture Campus remains relatively consistent with or without transit vehicles whereas using the Parkdale Avenue option would add 3 minutes 30 seconds in the morning peak direction (eastbound) and 1 minute 15 seconds in the afternoon peak direction (westbound). This is primarily due to the delay associated with the number of traffic signals along the Scott Street/Parkdale Avenue route. For this reason, it was determined that the route through the Tunney's Pasture campus would be the preferred route and was carried forward in the analysis of corridor Options 2 and 3 on the Ottawa River Parkway. It is noted that a traffic signal at the intersection of Colombine Driveway & Parkdale Avenue would be required to reduce the delay to eastbound transit vehicles and this was included in the travel time analysis summarized in Table 3.

Table 3: Travel Times from Tunney's Pasture Station to the Ottawa River Parkway

	Eastbound AM Peak		Westbound PM Peak	
	Tunney's	Parkdale	Tunney's	Parkdale
No Buses	2:15	3:45	2:00	3:00
With Buses	2:30	7:15	1:45	4:15

4.0 ANALYSIS OF DETOUR CORRIDOR OPTIONS

4.1 Methodology

The alternative corridors for the transit detours were analysed to determine the fastest travel time for transit vehicles and to review the impacts the transit detours would have on the general purpose traffic. As part of this analysis, signal timing plans and intersection lane arrangements were modified to improve operations. However, intersection modifications were only made at locations where it was considered feasible to implement in the near-term, prior to the LRT construction.

The travel time traffic analysis was undertaken using Synchro and SimTraffic. Synchro is a macroscopic traffic modeling software used to develop appropriate signal timing plans and report the intersection Level of Service (LOS). SimTraffic is a microscopic modeling software which was used to ensure that the delay and/or queues experienced at upstream and downstream signals were accounted for in the impact assessment and to determine vehicle and transit travel times.

Note that the travel time analysis for both Ottawa River Parkway Corridors (Options 2 and 3) was initially carried out based on Corridor 3. This was used to determine the feasibility of providing transit service on the Parkway compared to Scott Street.

4.2 Traffic Model Calibration

The results of the travel time runs, described in Section 4.4, along Scott Street and the Ottawa River Parkway were compared to the Synchro and SimTraffic results to ensure the traffic model was well calibrated to the existing conditions. Figure 12 and 13 show the average travel time along each corridor, with error bars reflecting the variability during the peak period found during the field travel time runs. In addition to a review of the travel times, the SimTraffic volumes were reviewed to ensure the model was properly calibrated to existing balanced traffic volumes in the corridor.

The results focus on the peak directions, eastbound in the AM peak hour and westbound in the PM peak hour. While both directions have been reviewed, it is most important to provide efficient transit service in the peak directions to meet the highest demand of passengers.

Figure 12: Scott Street Model Calibration

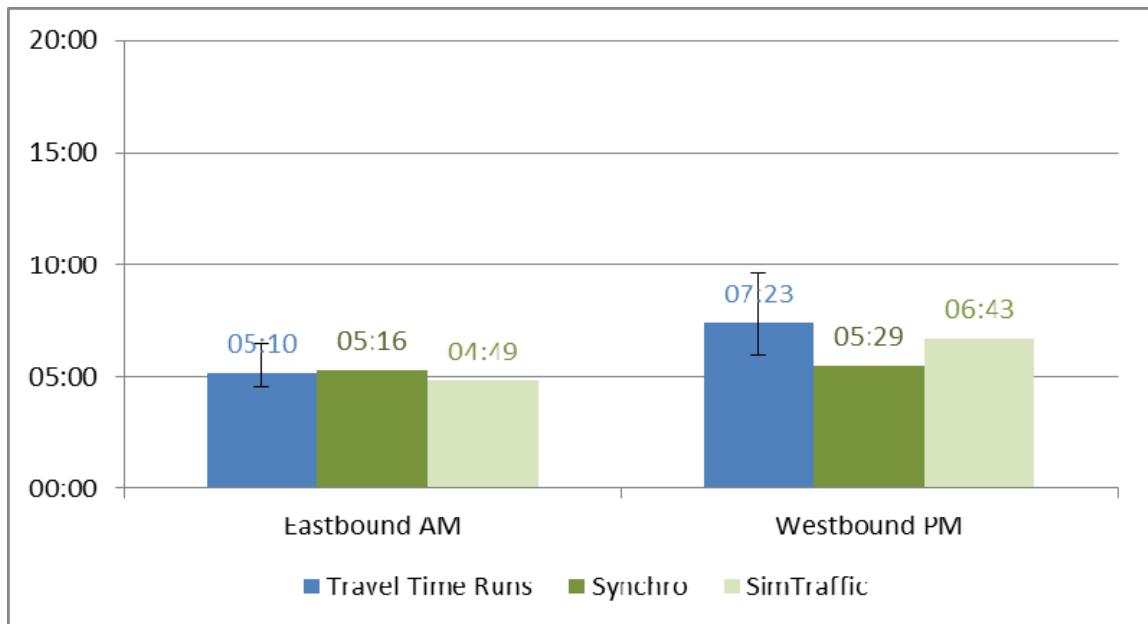
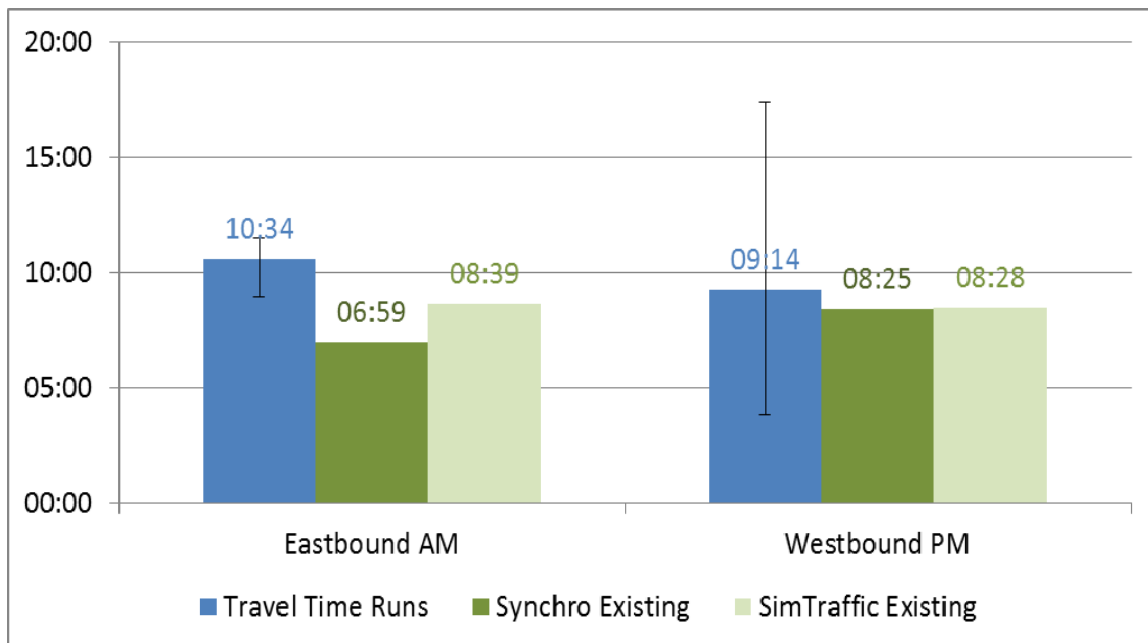


Figure 13: Ottawa River Parkway Model Calibration



4.3 Limitations of the Traffic Model

Both the Scott Street and Ottawa River Parkway traffic models include Bronson Avenue to the east and Churchill Avenue to the west. During the peak hours, both corridors are influenced by the traffic operations in downtown. Limitations within the traffic model may not accurately account for these influences. Assumptions have been made (as noted within the text) to reflect these limitations for comparison of the results of the different transit routing options however, these interactions should be reviewed in greater detail during the detailed design.

Synchro and SimTraffic are not designed to allow specific lanes to be dedicated to certain vehicles types (ex. Transit vs. cars). In order to estimate the impacts on the transit and general purpose traffic, separate traffic models were developed to provide a transit model (i.e. single lane in east and west directions for transit-only) and a general traffic model (i.e. single lane in east and west directions for general traffic). Traffic signal timing plans were optimized using the general purpose traffic model based on the assumption that the higher volume of general purpose traffic would govern the length of green time required by each movement. The limitation to this approach is the model cannot take into account the interactions between the transit lane and general purpose lanes such as general purpose traffic moving into the bus lane if the through lane is blocked by a left-turning vehicle. Another limitation to SimTraffic is that it cannot accurately account for the delay caused by local buses blocking the bus lane. This will create added delay to all buses using the transit lane in addition to the delay estimated by the traffic model. Nonetheless, the analysis is considered to provide a reasonable degree of accuracy for comparison purposes from which to select the preferred corridor for the transit detours. It is recognized that in the process of completing the detailed design for the recommended corridor, additional detail will be paid to ensure the interactions between the general purpose traffic and the transit vehicles are addressed.

4.4 Traffic Model and Analysis of Options

4.4.1 Scott Street

Scott Street was analysed based on the conceptual design developed by CTP which included dedicated bus lanes between Goldenrod Street and downtown. The westbound bus lane is a curb side lane from downtown to Goldenrod Street. Eastbound, a median bus lane was shown in the CTP plan from Goldenrod Street to Bayview where it switches over to a curb side lane to continue into the downtown and service stations at Bayview and LeBreton. The crossover creates a weave of approximately 300m (interrupted at 130m by the Bayview intersection) in which all vehicles and buses must switch lanes. The SimTraffic model is unable to designate transit vehicles to specific lanes, and therefore could not accurately evaluate the weave created by this design. For the purposes of the preliminary evaluation or corridors, this weave was not considered in the traffic model.

The CTP plan also includes turn prohibitions at the following locations which were included in the analysis:

- Holland Avenue – Eastbound left turn
- Hinchey Avenue – Eastbound left turn
- Carruthers Avenue – Eastbound left turn

The expected travel times along the Scott Street corridor for bus service (Transitway and Transitway/Express) and general purpose traffic are shown below in Figure 14 and

Figure 15. The solid red line shown in these figures represents the existing travel time for Transitway vehicles (including dwell time at stops) between Tunney's Pasture and downtown of four minutes. The results presented in the graphs assume a total of 1 minute 45 seconds of dwell time for transit vehicles stopping at Bayview Station and LeBreton Station. While the express buses along the corridor are not required to stop at these stations, it has been assumed that they will be caught behind Transitway buses and therefore would experience a similar delay of 1min 45s.

The travel times estimated at this stage of the analysis are considered preliminary as additional detail would be required to finalize the signal timing plans, queue lengths, and turn prohibitions.

The addition of transit service in dedicated bus lanes adds approximately 3 minutes of travel time to general traffic in the peak direction (eastbound in AM, westbound in PM). Travel time for bus service will increase from the existing 4 minutes on the Transitway to 8 minutes in the AM peak and 6 minutes in the PM peak.

Figure 14 – Scott Street Eastbound Travel Times – AM Peak Period

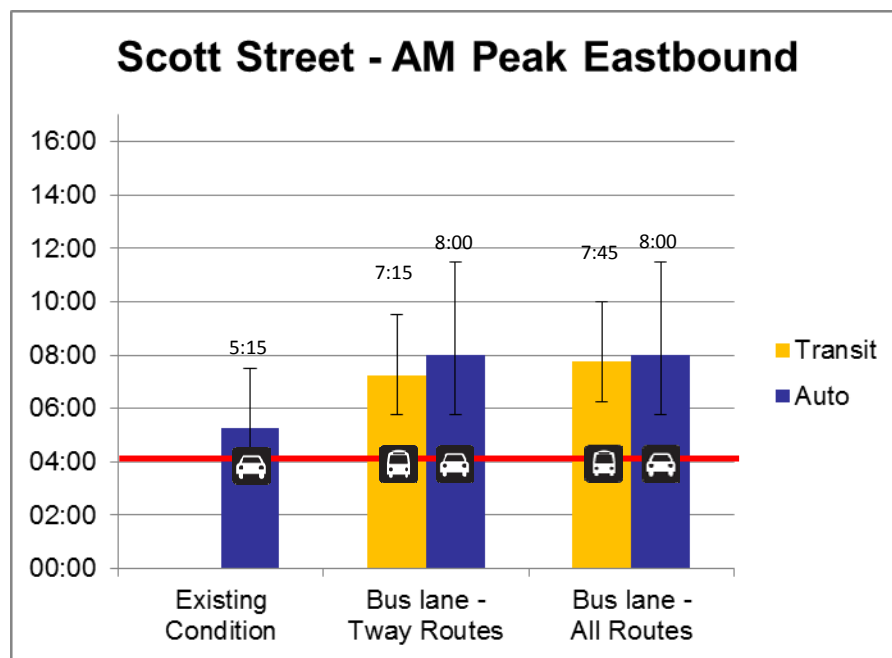
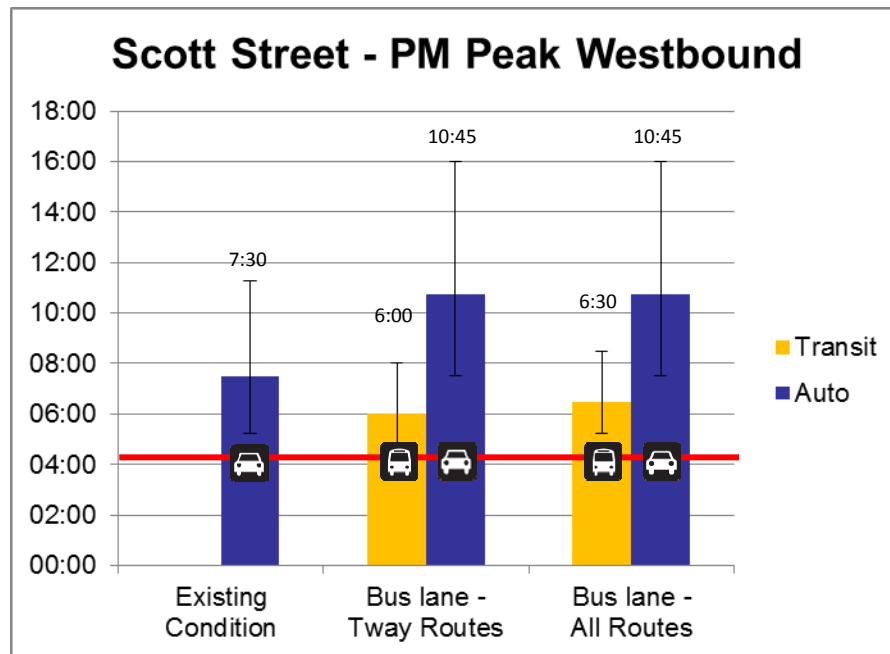


Figure 15 – Scott Street Westbound Travel Times – PM Peak Period



4.4.2 Ottawa River Parkway

The travel time analysis for both Ottawa River Parkway Corridors (Options 2 and 3) was initially carried out based on the arrangement of Option 3 (Ottawa River Parkway to downtown via Lyon/Bay Street). This was used to determine the feasibility of providing bus lanes on the Parkway and also to determine whether or not the Parkway could accommodate the addition of all Transitway and Express services in comparison on detouring only express routes on the Ottawa River Parkway.

The route between Tunney's Pasture Station and the Ottawa River Parkway was assumed to have transit vehicles operating in mixed flow. Once on the ORP, an assessment of transit vehicles operating in mixed traffic as well as in a dedicated bus lane was undertaken. When operating in a dedicated transit lane, it was assumed for the analysis that only Express transit services would be on the corridor. If all transit vehicles operated in the dedicated lane, the impacts to both transit and general purpose traffic are expected to be similar and therefore a separate analysis was not carried out with all transit vehicles in a dedicated lane.

The dedicated transit lanes were assumed to be one of the two existing lanes on the ORP designated as transit-only lanes. The transit lanes were assumed to begin at Parkdale Avenue and continue to Lyon Street in the eastbound direction and begin at Bay Street and continue to Parkdale Avenue in the westbound direction.

The results are shown in Figure 16 and Figure 17. It can be seen that dedicated bus lanes could not be provided on the Parkway without introducing severe congestion for general traffic (travel time increase of 10 minutes eastbound in the morning peak and 26 minutes westbound in the afternoon peak). This does not account for the added delay and congestion in the downtown. With added congestion along Wellington Street, there

would likely be a significant impact on vehicles and STO buses using the Portage Bridge travelling to/from Quebec. With limited interprovincial bridges, it is not expected that many vehicles would divert to other routes. STO and OC Transpo has approximately 120 buses per hour crossing the Portage Bridge during peak periods and the added delay would impact their service operations. The other conclusion that can be drawn from this analysis is that all Transitway and Express services could not be accommodated in mixed traffic without causing severe congestion and highly variable travel times. For these reasons, further analysis of Transit scenarios using the Ottawa River Parkway was restricted to only Express bus service operating in mixed traffic.

Figure 16 – Ottawa River Parkway Eastbound Travel Times – AM Peak Period

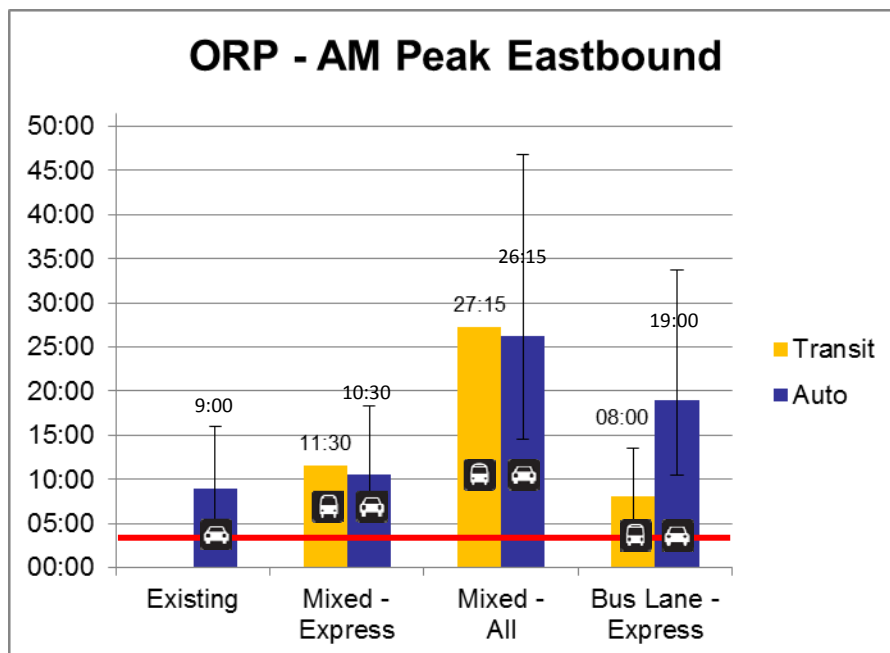
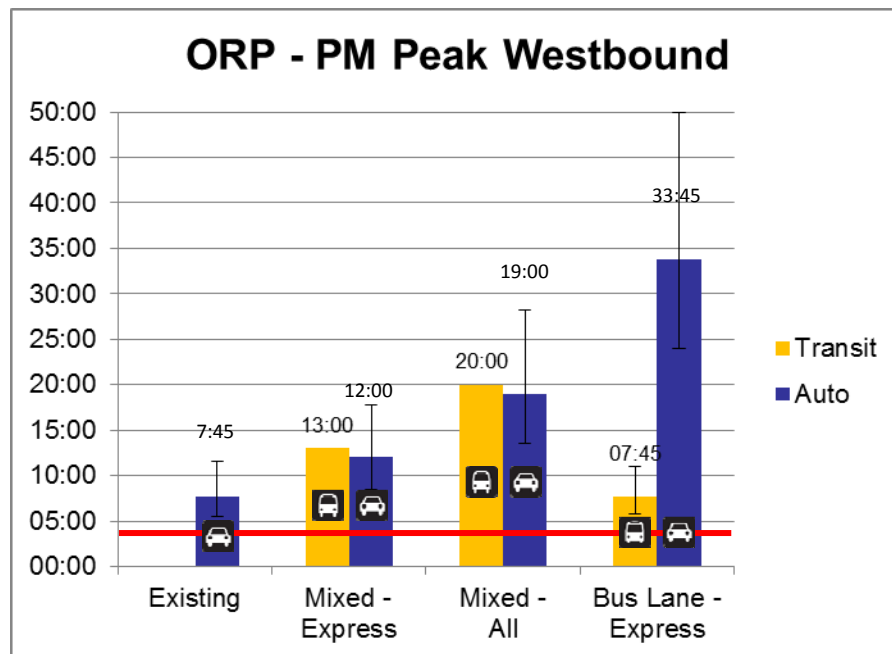


Figure 17 – Ottawa River Parkway Westbound Travel Times – PM Peak Period

4.5 Preferred Corridor Selection

The travel time analysis carried out and described in the previous section was one criterion used to evaluate the preferred corridor. Additional criteria are listed below and the evaluation is discussed in a separate report titled “OLRT Transit Construction Detours for the West End.”

- Maintain existing transit routings as closely as possible to current operations
- Minimize additional transit user travel times
- Minimize additional transfers
- Minimize additional resources (buses and kms)
- Minimize additional bus traffic in residential areas
- Minimize disruption to road users

Based on the evaluation, the following recommendations were made:

- Build the temporary station at Tunney’s Pasture, ramp connection from the Transitway and signalized connection to Scott Street at Goldenrod;
- Operate all Transitway and express routes on Scott Street from Goldenrod to Booth Street in bus lanes as proposed in the main report (Section 4); and
- Provide a pedestrian connection from the south side of Scott Street to the O-Train Station at Bayview with expanded and improved waiting areas on both sides of Scott Street.

5.0 REFINEMENTS TO PREFERRED OPTION

The preliminary analysis carried out and described above was based largely on the CTP conceptual plan developed for Scott Street with an eastbound median bus lane between Goldenrod and Bayview and curb bus lanes throughout the remainder of the corridor. A detailed assessment and comparison of advantages and disadvantages was carried out for curb versus median bus lanes along Scott Street. The evaluation identified that the provision of continuous curb side transit lanes in both directions between downtown and Goldenrod Street along Scott Street best served transit and traffic operations. The assessment can be found in Appendix E.

Based on the preferred implementation of curb side bus lanes, additional refinements to the Scott Street traffic model were carried out to finalize the conceptual plan for transit lanes on Scott Street, in terms of lane arrangements. This included a review of storage lane lengths, signal timing plans, turn prohibitions and vehicle delay. A number of changes have been made to the intersection geometry and signal timing plans along Scott Street to accommodate a dedicated curb side transit lane in both direction between Bronson Avenue and Tunney's Pasture Station. The required changes that were identified are summarized in Table 4 and the preferred lane arrangements are also shown in Appendix F.

It should be noted that the recommended changes outlined in Table 4 include the lane arrangements proposed by CTP at Booth and Preston Streets with slight adjustments to the storage lane lengths based on the traffic analysis undertaken. However, upon review of the large footprint required to accommodate the identified CTP lane configurations a number of modifications are proposed by MRC to address both geometric and traffic operation concerns in the immediate vicinity. These proposed modifications are outlined in Appendix F and are offered as a means to reduce the lane requirements associated with the CTP alternative. It should also be noted that as such, the modifications which are largely associated with the Booth Street were not analysed in significant detail due to the requirement for a new north-south detour connection during the Booth Street Station construction. Consequently, the modifications offered can be analysed in concert with the proposed Booth Street traffic detours.

Table 4: Recommended changes to the Scott Street corridor to accommodate transit lanes

CROSS-STREET	DESCRIPTION OF CHANGES
Goldenrod Street	<ul style="list-style-type: none"> • New traffic signal added at Scott/Goldenrod • At least 80m of storage is required for the southbound left movement. Due to limited storage space, the intersections of Goldenrod/Tunney's Pasture Station and Goldenrod/Scott will require special attention should signalization be considered. Consequently timing plans at this location will be best developed and evaluated by CTP as part of the Tunney's Pasture Station design. Alternatively, in our opinion consideration of implementing operating procedures for OC Transpo could allow an unsignalized intersection at Goldenrod/Tunney's Pasture Station to function and offer the preferred arrangement.
Holland Avenue	<ul style="list-style-type: none"> • Eastbound left turn movement remains banned during the PM peak period. • During the PM peak period, the cycle length was extended from 100s to 120s (as were the other nearby intersections) • The northbound left turn movement was provided with both protected & permissive phases.
Parkdale Avenue	<ul style="list-style-type: none"> • The northbound left and southbound left movements will be banned during AM and PM peak periods. • Southbound lane arrangement will be modified to provide for a southbound right turn storage lane and the southbound left turn storage lane removed (shared with through movement). • The cycle length was extended from 100s to 120s (as were the other nearby intersections) during the PM peak hour. • Minor signal timing adjustments were made to the signal timing during the AM peak hour.
Carruthers Avenue	<ul style="list-style-type: none"> • No changes made

CROSS-STREET	DESCRIPTION OF CHANGES
Bayview	<ul style="list-style-type: none"> • A westbound left turn storage lane of 25m is required. To accommodate the left turn lane, the existing right turn lane will be removed. • No adjustments required to the signal timing plans during the AM peak hour. • The cycle length was extended from 100s to 120s (as were the other nearby intersections) during the PM peak hour.
Preston Street	<ul style="list-style-type: none"> • Minor adjustments were made to the signal timing plans during the AM peak hour. No adjustments were required during the PM peak hour.
Booth Street	<ul style="list-style-type: none"> • Intersection design developed based on CTP concept. • Signal timing plans adjusted for both the AM and PM peak hours. • Westbound left turn movement permitted during peak periods (currently banned)
Empress Avenue	<ul style="list-style-type: none"> • Traffic signal removed
Bronson Avenue/Slater Street	<ul style="list-style-type: none"> • No changes made
Bronson Avenue / Albert Street	<ul style="list-style-type: none"> • No changes made

5.1 Preferred Option Operations

With the recommendations summarized in the previous section, the traffic operations were analyzed for the preferred corridor option. The LOS along Scott Street at intersections are expected to decrease with the implementation of transit lanes. The only exception is the intersection of Scott Street & Parkdale Avenue where the overall intersection operation improves as a result of banning the northbound and southbound left turns during peak periods in the future. Without these turn restrictions in place, this intersection would fail to operate at an acceptable LOS.

Table 5: Scott Street Peak Hour Intersection Operations

Intersection	AM PEAK		PM PEAK	
	Existing	Future	Existing	Future
Albert & Bronson	A	A	A	A
Slater & Bronson	C	C	A	A
Albert & Booth	B	C	D	D
Scott & Preston	A	D	A	B
Scott & Bayview	A	A	A	B
Scott & Carruthers	A	A	A	A
Scott & Parkdale	B	C	E	C
Scott & Holland	A	B	A	C

The impact on vehicle and transit travel times for the preferred corridor option with intersection refinements is highlighted in Figure 18 and Figure 19. The transit travel times include an additional 1min 45s of dwell time associated with stops at Bayview and LeBreton Stations. The vehicle travel times are typically expected to increase by up to two minutes between Holland Avenue and Bronson Avenue. The transit travel times are expected to increase by approximately two to three minutes above the four minute travel time on the existing Transitway.

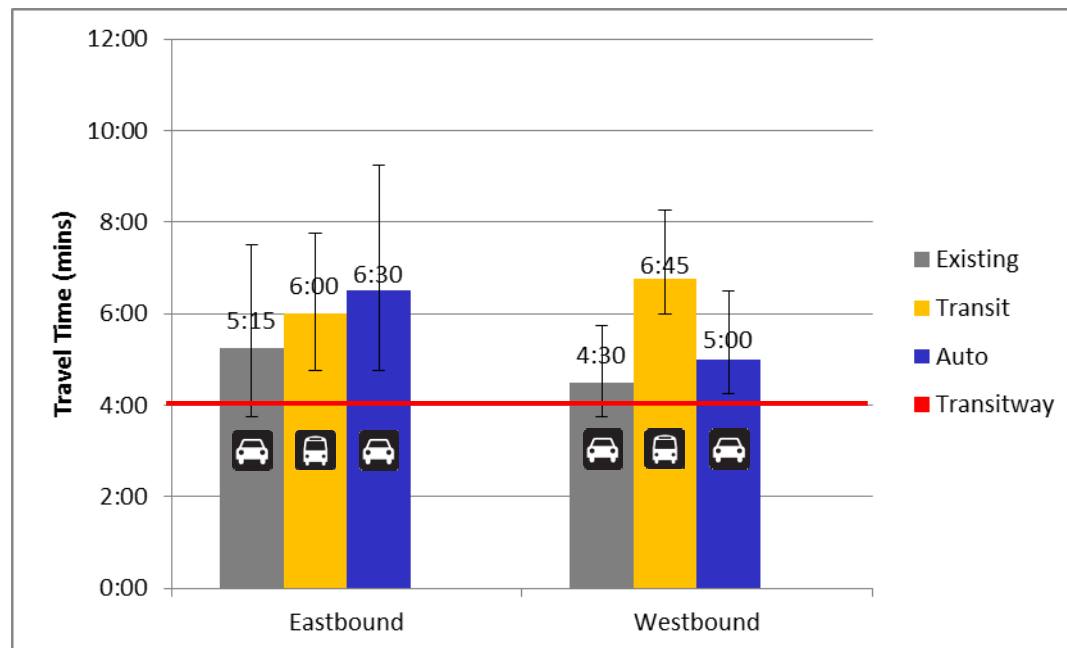
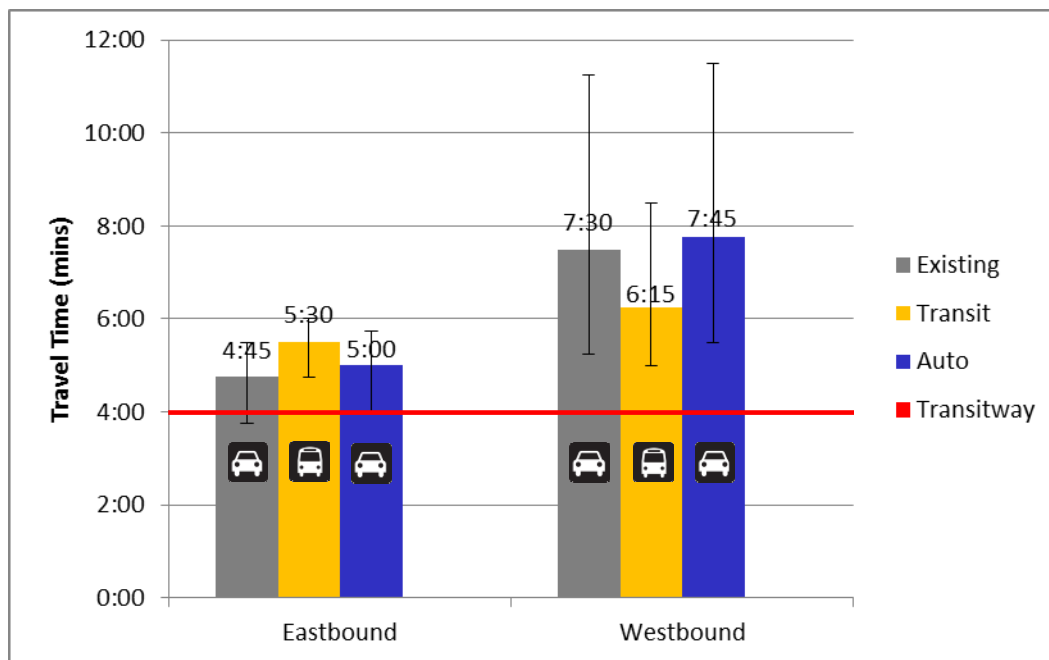
Figure 18: Scott Street AM Peak Hour Travel Times

Figure 19: Scott Street PM Peak Hour Travel Times



6.0 FUTURE ANALYSIS AND REFINEMENTS

Additional analysis is required to refine the conceptual plan developed as part of this study. The additional analysis should include a review of the traffic signal coordination with the downtown network and ensure the delays in this area are adequately quantified based on their close proximity to the downtown road network.

Further refinement of the Tunney's Pasture Station design will be required to finalize the signal timing plan for the Goldenrod Street intersection on Scott Street. In addition, if the intersection of Tunney's Pasture Station & Goldenrod Street remains unsignalized, transit operational procedures will be required to ensure eastbound buses are able to efficiently exit the station and turn left onto Scott Street.

In addition, CTP is reviewing the various options to provide an interim connection between Scott Street and the Ottawa River Parkway in the area of Booth Street due to the requirement of a Booth Street closure during construction of the LRT. Discussions to date have included the possible use of a Broad Street connection or Preston Street extension as an interim link during OLRT construction activities in the area. Once a preferred traffic detour is confirmed, further analysis of Scott Street between Preston Street and Empress Avenue will be required to ensure transit and general purpose traffic operates effectively through this area. This study has applied the most recent CTP plan for the Booth Street/Albert Street Intersection and has also provided an alternative lane arrangement for this area. It is understood that the design in this area has not been finalized and could be refined further during the Albert Street corridor retrofit project. The intersection operations at Booth Street should be reviewed during this additional analysis as more details are determined.

APPENDIX D

Analysis of Transit Resource Requirements

Conversion Factors for Transit Comparison

26-Oct-11

DISTRIBUTION OF SERVICES THROUGHOUT THE DAY:

period	revenue veh-hr		boardings	
am	1488	26%	103638	26%
pm	1523	27%	119658	30%
am + pm	3011	53%	223296	56%
off peak	2709	47%	175051	44%
all day	5720		398347	

From April 2007 OC Transpo Operating Statistics

Service performance review: Exhibit 3

ASSUMPTIONS:

		vehicle-hrs	pass-hrs		
AM Peak Period	=	2.5	2	x	AM Peak Hour
PM Peak Period	=	2.5	2	x	PM Peak Hour
Off Peak Period	=	1.00	1.00	x	AM Pd + PM Pd
Annual	=	300	300	x	AM + PM + Off

Operating expense \$ 130.00 per vehicle-hour
Growth 3% per year

INDICATORS FOR SCENARIOS:

Total Additional Veh-hr Compared with Existing Transitway

		Scenario: Transitway on Scott	Scenario: Express buses on Scott	Scenario: Express buses ORP to Scott to Bronson in mixed traffic	Scenario: Express buses ORP to Bronson (direct) in mixed traffic
AM peak hour - EB	veh-min	212	144	432	522
AM peak hour - WB	veh-min	380			
PM peak hour - EB	veh-min	153			
PM peak hour - WB	veh-min	200	171	247	684
AM peak hour	veh-hr	10	2	7	9
PM peak hour	veh-hr	6	3	4	11
AM peak period	veh-hr	25	6	18	22
PM peak period	veh-hr	15	7	10	29
Off peak periods	veh-hr	39	13	28	50
Annual	veh-hr	23619	7875	16975	30150

CURRENT 2011

Annual Bus operating Costs	@ \$130 / veh-hr	\$ 3,100,000	\$ 1,100,000	\$ 2,300,000	\$ 4,000,000
Number of additional Buses		10	3	8	12
+15% spares		12	3	9	14
Annual Passenger Delays		619,000	283,500	611,100	1,085,400

FUTURE 2016

Annual Bus operating Costs		\$3,600,000	\$1,300,000	\$2,700,000	\$4,600,000
Number of additional Buses		12	4	10	14
Number of Additional Buses	including spares	14	4	11	16

2016 INCLUDING CONTINGENCY 20%

Annual Bus operating Costs (2011)	\$	3,720,000	\$	1,320,000	\$	2,760,000	\$	4,800,000	
Annual Bus operating Costs (2016)	\$	4,320,000	\$	1,560,000	\$	3,240,000	\$	5,520,000	
Number of Additional Buses		14		4		10		14	-
Number of Additional Buses	including spares	17		4		11		16	-

TranstwayBuses_AM Peak Hour

EASTBOUND - AM Peak

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Transitway Buses	# Deadhead Buses	# Transitway Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
T.1	1	TP to Bronson on Scott Street	6	94	12	4230	4	2	8460	212

WESTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Transitway Buses	# Deadhead Buses	# Transitway Passengers	Existing Transitway Travel Time	Additional Total Travel Time on Corridor - Incl.	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
T.1	1	Bronson to TP on Scott Street	6.75	74	64	3330	4	2.75	9158	380

TransitwayBuses_PM Peak Hour

WESTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Transitway Buses	# Deadhead Buses	# Transitway Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
T.1	1	Bronson to TP on Scott Street	6.25	81	8	3645	4	2.25	8201	200

EASTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Transitway Buses	# Deadhead Buses	# Transitway Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
T.1	1	TP to Bronson on Scott Street	5.5	76	26	3420	4	1.5	5130	153

Express_AM Peak Hour

EASTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Express Buses	# Express Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
E.1	1	TP to Bronson on Scott Street	6	72	3240	4	2	6480	144
E.2	2A	TP to ORP through TPC, ORPR to Scott to Bronson - Mixed Traffic	10	72	3240	4	6	19440	432
E.3	2B	TP to ORP through TPC, ORP to Bronson - Mixed Traffic	11.25	72	3240	4	7.25	23490	522

WESTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Express Buses	# Express Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time - Not Incl. Stops (min)
No Express Buses in Off-Peak Direction									

Express_PM Peak Hour

WESTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Express Buses	# Express Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time (min)
E.1	1	TP to Bronson on Scott Street	6.25	76	3420	4	2.25	7695	171
E.2	2A	TP to ORP through TPC, ORPR to Scott to Bronson - Mixed Traffic	7.25	76	3420	4	3.25	11115	247
E.3	2B	TP to ORP through TPC, ORP to Bronson - Mixed Traffic	13	76	3420	4	9	30780	684

EASTBOUND

Scenario	Path #	Path	Bus Travel Time - Incl. Stops (min)	# In-Service Express Buses	# Express Passengers	Existing Transitway Travel Time (min)	Additional Total Travel Time on Corridor - Incl. Stops (min)	Total Additional Pass. Travel Time (min)	Total Additional Bus Travel Time - Not Incl. Stops (min)
No Express Buses in Off-Peak Direction									

APPENDIX E

Comparison of Bus Lane Configurations On Scott Street



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MEMO

TO: Helen Gault
FROM: Kimberley Hunton
DATE: September 15, 2011
COPIES: Don Stephens, Meghan Whitehead
OUR FILE: 34110222-703
SUBJECT: Comparison of Bus Lane Configurations on Scott Street

An analysis was carried out to identify the best transit detour(s) for Transitway service west of Bronson Avenue during the construction of the LRT. This analysis concluded that a dedicated bus lane on Scott Street would be required to accommodate detoured transit services. Two bus lane concepts were assessed for this study.

- A concept developed by the CTP team and included a curb bus lane for westbound transit vehicles and had eastbound transit vehicles operating in a median bus lane from a new intersection on Scott Street at Goldenrod to Bayview Road and then a curb bus lane east of Bayview Road; and
- A concept with curb bus lanes in both directions.

It should be noted that Transitway and Express bus routes serve the Transitway Stations of Tunney's Pasture, Bayview and Lebreton, therefore there is the potential to have a median bus lane between Tunney's Pasture and Bayview where no access to a stop would be required. Due to the constrained cross section on Scott Street and requirement to minimize expenditures for temporary construction, it is assumed a median bus would only be implemented between Tunney's Pasture and Bayview Avenue where new construction of bus stations in the median would not be required.

A review was carried out to determine if the previously analyzed median / curb bus lane combination was the best lane arrangement.

Key considerations in this comparison include:

- Transit system performance
- Traffic infiltration into the adjacent residential neighbourhoods
- Traffic delay
- Road safety
- Access to adjacent businesses and residences
- Fire, police and emergency services access
- Construction cost

To carry out the comparison a review was carried out taking into consideration advantages and disadvantages for median bus lanes compared to curb bus lanes. Each criteria above was looked at and is summarized below. In cases where the conditions differ for the eastbound and westbound directions, separate discussion has been included.

Based on a qualitative, and where available, quantitative assessment, the bus lane configuration scenario with the lesser negative impacts was carried forward as the preferred option for each factor. The end result for the selection of curb or median lane is based on a professional judgement and assessment of the information herein.

Based on the discussion and findings that follow it is concluded that the **curb bus lanes** are the preferred option for both directions for the entire length of the corridor. While this will minimize the impact of traffic infiltrating through the neighbourhoods and ultimately traffic delays it does have a more negative impact on transit performance. This is due to local buses stopping in the curb bus lane as well as the integration of right turning vehicles at cross streets and entries for adjacent businesses with transit vehicles. There are potential mitigation measures that could be looked at to address these concerns such as the addition of right turn storage lanes, right turn prohibitions during the peak hours at cross streets, the potential reconfiguration of entrances to local businesses and residences where possible (i.e. combining entrances to better define their location during the retrofit) and the inclusion of bus bays for local bus stops where possible. The concept plan and analysis has taken these mitigation measures into consideration.

• **TRANSIT SYSTEM PERFORMANCE**

The performance of the transit system is based on the predictability of the bus arrival and reliability of maintaining the schedule. Therefore any location where the bus could be delayed along the corridor presents a potential impact on the transit system performance.

For **curb bus lanes** general traffic utilizing the bus lane for access to private establishments and right turns at cross streets could result in uncertainty of arrival times and transit delay. As well local buses operating in the curb lane could result in additional delay to Express and/or Transitway buses where there is no passing lane at a local stop, this could result in uncertainty of arrival times and transit delay.

The **median bus lanes** would have minimal conflict points with general traffic which provides more predictable and reliable travel times in the corridor. That said, there would be a major shift required where median lanes would switch to curb lanes that would require a weave area with general traffic. For this weave to happen with minimal conflict, a bus only signal would be required to assist buses moving into the curb lane (blind side merge) which would add delay to operations within corridor, although these delays would likely be consistent.

	Transit Performance	
	Eastbound	Westbound
Curb Bus Lane	- 10 cross streets with right turns. Right turn volumes vary from 10 vph at local streets to 110 vph at Parkdale Avenue in peak hour. Right turns could interfere with transit operations, particularly if pedestrian volumes are	- 4 cross streets with right turns. Right turn volumes vary from 5 vph at some local streets to 70 vph at Parkdale Avenue in the peak hour. Highest pedestrian volume is at Holland (approximately 100 pedestrians in both

	Transit Performance	
	Eastbound	Westbound
	<p>high; Highest pedestrian volume is at Holland in the AM peak (60 pedestrians).</p> <ul style="list-style-type: none"> - Local buses in curb lane could block Express and Transitway buses at stops (up to an additional 2 minutes for corridor). This would impact 13% of the buses in the AM peak and 7% of the buses in the PM peak. - It is estimated that there are 2 to 5 entrances to private establishments (parking areas, businesses and residences) within each block between Holland and Hinchey and in the blocks of Stirling to Pinhey and Garland to Hilda where buses and cars will interact and potential delay to buses could be introduced. - There currently exists a no stopping zone from 7-9 and 3:30 to 5:30 along Scott Street, that said, vehicles currently stop to drop off/pick up passengers for Tunney's Pasture at Holland Cross on Scott Street. This 'loading area' could have a direct impact on transit performance. Strict enforcement of the no stopping zone would be required. 	<p>the AM and PM peaks.)</p> <ul style="list-style-type: none"> - Local buses in curb lane could block Express and Transitway buses at stops (up to an additional 2.5 minutes for corridor). This would impact 13% of the buses in the AM and PM peaks. - due to the existing trench for the Transitway, there are no accesses to private establishments within this section of roadway.
Median Bus Lane	<ul style="list-style-type: none"> - EBL at Parkdale Avenue in PM peak hour is approximately 200 (increased from 140 vph due to left turn prohibitions in corridor), requiring a storage length of 60m. There is the potential EBL vehicles could overflow into median lane, thereby blocking transit and causing delay. - A separate phase to the Bayview signal would likely be implemented (to permit shift to curb bus lane) which results in an increase of EB bus delay of approximately 1 minute in the AM and PM peaks (v/c increases from 0.2 to 0.8 in the AM peak and 0.14 to 0.93 in the PM peak for EB transit). 	<ul style="list-style-type: none"> - WBL at Holland Avenue in PM peak hour is approximately 135, requiring a storage length of 40m. There is the potential the WBL vehicles could overflow into the median lane, thereby blocking transit and causing delay. - Delay could be incurred by transit vehicles merging to curb lane to turn into Tunney's Pasture Station.
Result	<p>Median Bus Lane</p> <p>Provides a more reliable service, particularly in the eastbound direction. Delay for shift at Bayview (and potentially Holland WB) could be accounted for in the</p>	

	Transit Performance	
	Eastbound	Westbound
	schedule to not impact the reliability of the service.	

• **TRAFFIC INFILTRATION INTO ADJACENT RESIDENTIAL NEIGHBOURHOODS**

By integrating transit only lanes on Scott Street some turning prohibitions will be required, particularly for left turns when there is a median bus lane. The turning prohibitions could introduce additional traffic through the local residential streets. Traffic on adjacent residential streets may also increase due to driver frustration of delay on Scott Street, resulting in some cut-thru traffic.

With buses operating in the **curb bus lanes** there is a reduced likelihood of vehicles turning right through an adjacent neighbourhood (to avoid delay at intersections) due to the additional lane change requirement. The curb lanes also require fewer turning prohibitions which would result in less out-of-way travel through adjacent neighbourhoods for access to/from Scott Street. That said, it is noted that some right turn prohibitions could be introduced to reduce transit delay, which may result in additional traffic infiltration into adjacent neighbourhoods.

For **median bus lanes** there are a number of left turn prohibitions required which would mean access to/from Scott Street would be via residential streets. There is also the possibility that driver frustration due to delay of vehicles behind local buses could result in drivers ‘cutting-thru’ adjacent neighbourhoods.

	Traffic Infiltration into Adjacent Residential Neighbourhoods	
	Eastbound	Westbound
Curb Bus Lane	<ul style="list-style-type: none"> - With the bus lane in the curb, vehicles are less likely to attempt cutting-through adjacent neighbourhoods due to additional lane change. - Fewer turning prohibitions results in less out-of-way travel through adjacent neighbourhoods for access to/from Scott Street. 	<ul style="list-style-type: none"> - With the bus lane in the curb, vehicles are less likely to attempt cutting-through adjacent neighbourhoods due to additional lane change. - Fewer turning prohibitions results in less out-of-way travel through adjacent neighbourhoods for access to/from Scott Street.
Median Bus Lane	<ul style="list-style-type: none"> - 3 left turn prohibitions (Hinchey, Carruthers and Holland – Holland prohibition currently exists) required where no left turn storage lane is provided. On average this is equivalent to 25 vph in the peak hour at each intersection which could infiltrate into the adjacent neighbourhood. - General traffic will be delayed behind local buses at stops in the corridor 	<ul style="list-style-type: none"> - 7 left turn prohibitions (Pinhey, Stirling, Carruthers, Hinchey, Pinehurst, Huron and Caroline) required where no left turn storage lanes. On average this is equivalent to 20 vph in the peak hours at each intersection (i.e. 140 vehicles infiltrating into adjacent neighbourhood.) - General traffic will be delayed behind local buses at stops in the corridor

	Traffic Infiltration into Adjacent Residential Neighbourhoods	
	Eastbound	Westbound
	<p>which may entice drivers to go around through the local neighbourhoods. There are 3 EB stops (farside stop at Holland, nearside stop at Stirling and nearside stop at Bayview). The near side stops will likely cause less opportunity for drivers to infiltrate through adjacent neighbourhoods.</p> <p>- There are a greater number of cross streets in the EB direction for access into adjacent neighbourhoods.</p>	<p>which may entice drivers to go around through the local neighbourhoods. There are 4 WB stops (farside stop at Holland, nearside stop at Hinchey, farside at Merton and nearside stop at Bayview). The near side stops will likely cause less opportunity for drivers to infiltrate through adjacent neighbourhoods.</p>
Result	<p>Curb Bus Lane</p> <p>Due to fewer turning prohibitions the curb side bus lanes will likely result in a lower amount of traffic infiltrating into the adjacent neighbourhoods.</p>	

• **TRAFFIC DELAY**

The performance of the overall corridor and ultimately bus lane will relate to the amount of traffic delay occurring in the corridor. While it is not foreseen that there would be a significant impact for delay of general traffic with a **curb bus lane**, the placement of the bus lane could impact traffic delay in different ways. For example a **median bus lane** could require separate signal phases at intersections thereby increasing the delay for other directions, and through traffic on Scott Street could experience delays due to right turning vehicles from the curb lane yielding to crossing pedestrians. In addition, for a median bus lane, general traffic in the curb lane could be delayed behind local buses (no opportunity to pass). To estimate the impact of delay due to local buses traveling in the curb lane it was assumed that each local stop would incur a 40s delay (this includes a 20s acceleration/deceleration time, 10s clearance interval and dwell time for 3 passengers boarding/alighting. The stop time of the bus (40s) was then multiplied by the number of buses in the hour to determine the added stop delay in the lane. This was then translated to a percentage of vehicles in the hour that would be impacted by the local bus, it should be noted that this percent does not take into account the accumulation of vehicles due to the delay and arrival rate of the hourly flow. This factor is to discuss the delay for general traffic vehicles only, delay to bus operations is included under Transit System Performance.

	Traffic Delay	
	Eastbound	Westbound
Curb Bus Lane	- No significant foreseen for delay to general traffic.	- No significant foreseen for delay to general traffic.
Median Bus Lane	- 85 vehicles in the AM peak hour and 40 vehicles in the PM peak hour would incur additional delay due to local buses stopping in the general traffic lane (curb lane). This represents approximately 13% and 7% of traffic for the AM and PM peaks respectively. Added delay for the length of the corridor would be in the order of 2	- 60 vehicles in the AM peak hour and 75 vehicles in the PM peak hour would incur additional delay due to local buses stopping in the general traffic lane (curb lane). This represents approximately 13% of traffic for both the AM and PM peaks. Added delay for the length of the corridor would be in the order of 2.5 minutes.

	Traffic Delay	
	Eastbound	Westbound
	<p>minutes.</p> <ul style="list-style-type: none"> - Adding a separate phase for EB buses at the Bayview intersection signal (to permit shift to curb bus lane) results in delay for EB through and right traffic of approximately 1 minute in both the AM and PM peak s. The v/c ratio increases from 0.35 to 1.0 in the AM peak and 0.33 to 0.66 in the PM peak for EB general traffic. - There currently exists a no stopping zone from 7-9 and 3:30 to 5:30 along Scott Street, that said, vehicles currently stop to drop off/pick up passengers for Tunney's Pasture at Holland Cross on Scott Street. This 'loading area' could have a direct impact on delay of general traffic in the curb lane and would require strict enforcement. 	<ul style="list-style-type: none"> - While not modeled, a separate phase would be required at Bayview for WB buses (again to permit the shift from a curb bus lane to a median bus lane) and at Holland. Delays could be expected to be similar to those shown in the EB direction.
Result	<p style="text-align: center;">Curb Bus Lane</p> <p>Curb bus lane would have less delays for general traffic as local buses would operate in bus lane, as well the extra phases at traffic signals would not be required adding delay to the overall corridor.</p>	

- **ROAD SAFETY**

The factor to look at road safety considered driver expectation and consistency per direction, non-conventional weaving or turn geometry and conflicts between buses and turning or merging vehicles. It was noted that a median bus lane implemented for one direction with a curb side lane for the opposite direction could result in driver confusion in the corridor due to inconsistencies in lane arrangements. Additional signage and lane markings would be required.

Curb bus lanes would require right turns from side streets to turn into the far median lane (thereby restricting the ability to right on a red), as well, additional conflicts would be introduced between buses and general purpose traffic due to turning vehicles accessing side streets.

If a **median bus lane** was implemented on Scott Street, the shift from between median bus lane and curb side bus lane would require a weave between buses and general traffic. This weave/merge is made more difficult when the bus would be merging to the right (driver's blind side.) In addition, where left turns would be permitted a crossover (weave) would be introduced for vehicles crossing the median bus lane to access the left turn lane.

	Road Safety	
	Eastbound	Westbound
Curb Bus Lane	- In the AM peak there are heavy right turn volumes from side streets wishing	- In the PM peak the right turn volumes from side streets are relatively low

	Road Safety	
	Eastbound	Westbound
	<p>to travel EB on Scott Street (approx. 150 vph at Holland and Parkdale). Curb bus lane would require these vehicles turning across the bus lane to enter the general traffic lane. A no right turn on red would be required from the north and south streets.</p> <ul style="list-style-type: none"> - Vehicles accessing businesses, parking lots and entrances on the south side of Scott Street will be merging with transit vehicles in the curb lanes, adding to the number of conflict potential. 	<p>with the exception of Parkdale Avenue where approx. 200 vph turn right to travel WB.</p> <p>Curb bus lane would require these vehicles turning across the bus lane to enter the general traffic lane. A no right turn on red would be required from the north and south streets.</p>
Median Bus Lane	<ul style="list-style-type: none"> - The shift from the median bus lane to curb bus lane at Bayview introduces a merge that would need to be managed. The merge for EB buses would be on the driver's blind side and would be required to occur over a distance of 170m. - Left turning traffic at Parkdale and Bayview will be required to merge across the bus lane. At Parkdale this will be approximately 150 veh in the AM peak and 200 veh in the PM peak due to left turn prohibitions along other areas of the corridor. At Bayview the EBL volumes are relatively low, however they are required to carry out the crossover in addition to the weave/shift of buses and vehicles for the change in bus lanes (this adds driver workload.) 	<ul style="list-style-type: none"> - There would be 2 shifts required between curb bus lanes and median bus lanes for WB direction. The first at Bayview and the second at Holland/Goldenrod to make the right turn into the Tunney's Transit Station. The merge at Goldenrod would be on the driver's blind side. - Left turning traffic at Parkdale and Holland will be required to merge across the bus lane. At Parkdale this will be approximately 70 veh in the AM and PM peaks and 70 vph in the AM and 140 veh in the PM peak at Holland.
Result	<p style="text-align: center;">Curb Bus Lane</p> <p>The more conventional curb bus lane will be easier to understand for drivers, it does not require merging across the bus lane for left turns or the shift between median to curb bus lanes at Bayview (and Goldenrod in the WB direction). In addition, given that the median bus lane would likely only be in the EB direction, consistency per direction will also be easier understood.</p>	

- **ACCESS TO ADJACENT BUSINESSES AND RESIDENCES**

This factor looked directly at whether there would be restrictions to accesses for businesses and residences adjacent to the Scott Street corridor, thereby having a potential impact on businesses.

The **curb bus lane** would be neutral from a business impacts perspective as there are no changes to accesses. The impacts would relate to conflicts between general traffic and transit vehicles

and delays to transit vehicles thereby impacting transit performance which are discussed in previous factors.

As previously noted, the **median bus lane** would require turning prohibitions which could reduce access to businesses/residences and could impact the number of vehicles that may stop at that business. Less severe impact on non-discretionary (doctor/lawyer/car dealership and residences) where customer is familiar with access requirements and more severe where business is discretionary (coffee shop, variety store) as customer will not just 'stop-in' if it is difficult to access.

	Access to Adjacent Businesses and Residences	
	Eastbound	Westbound
Curb Bus Lane	- Neutral from a business impacts perspective as no changes to accesses (impacts relate to conflicts between general traffic and transit vehicles and delays to transit vehicles thereby impacting transit performance.)	
Median Bus Lane	- No impact to businesses on south side of Scott Street, entrances and access points would operate as they currently do. Turning prohibitions for left turns out of accesses would likely be implemented. - Access to businesses and residences on the north side of Scott Street is via cross streets. Left turn prohibitions would be in place with a median bus lane that could impact access to businesses, however it would not be at the direct access point.	- Left turn prohibitions for accesses on south side of Scott Street (WBLs) would reduce accessibility to businesses. Businesses are mixed use and include the Beer Store, three auto repair shop/sales/centres, two parking lots, a convenience store and a gas station.
Result	Either Due to the Tranistway on the north side of Scott Street the businesses and residences in question are on the south side of the road, therefore there would only be an impact if a WB median bus lane were implemented. As this would not likely be the recommendation, the impact on access to adjacent businesses and residences is seen as neutral.	

- **FIRE, POLICE AND EMERGENCY**

Generally there is no significant impact (positive or negative) foreseen with **curb bus lanes** for added fire, police and emergency access whereas a **median bus lane** has the potential to provide a less congested path for emergency vehicles.

	Fire, Police and Emergency	
	Eastbound	Westbound
Curb Bus Lane	- No significant impact (positive or negative).	
Median Bus Lane	- Would provide a less congested path along bus lane (fewer vehicle conflicts).	
Result	Median Bus Lane While there would be a less congested path for emergency vehicles operating in	

	Fire, Police and Emergency	
	Eastbound	Westbound
	the median lane, there are no negative impacts on fire, police and emergency services if the bus lanes were in the curb.	

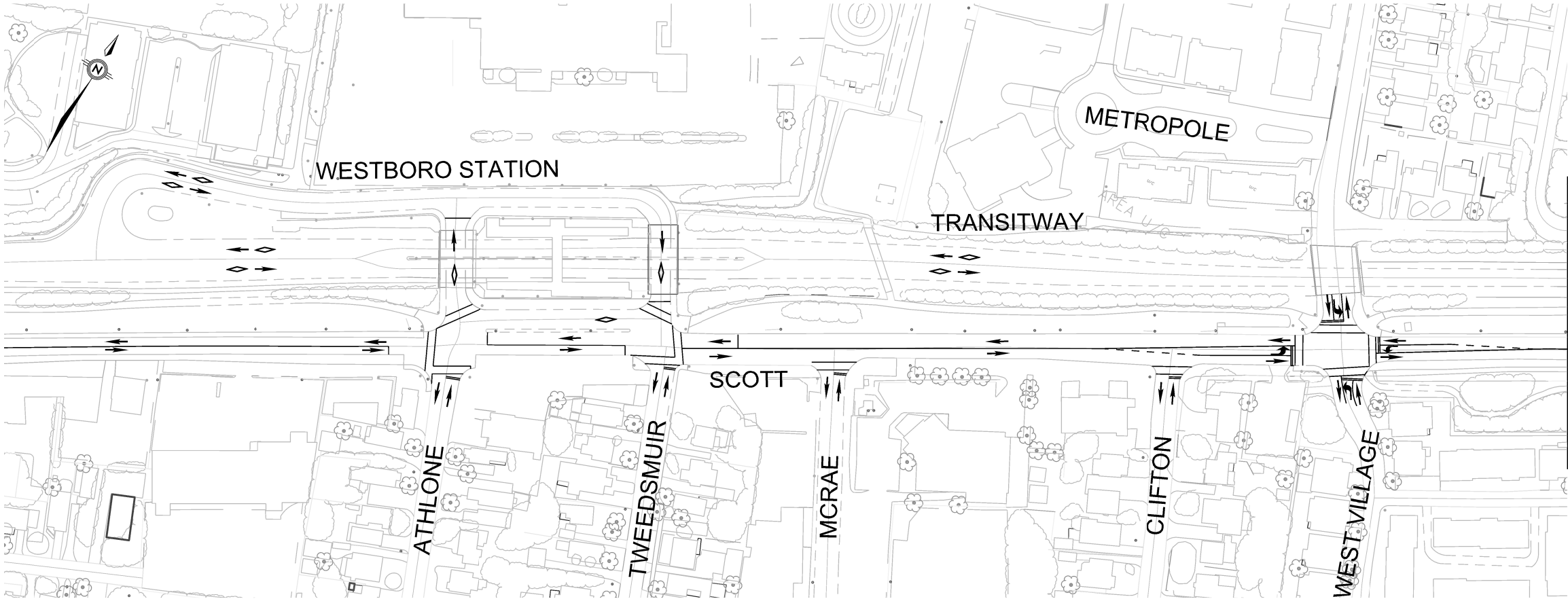
- **CONSTRUCTION COST**

The construction cost of the two scenarios as looked at from a high level for differences between the two options. Both options have the potential to require longer storage lengths, widenings in the corridor or the installation of bus bays.

	Construction Cost	
	Eastbound	Westbound
Curb Bus Lane	- Potential construction required for right turn storage, bus bays, widened lanes.	
Median Bus Lane	- Potential construction required for additional left turn storage, bus bays, widened lanes. - New transit signal required at Bayview Avenue.	- Potential construction required for additional left turn storage, bus bays, widened lanes. - New transit signal required at Bayview Avenue. - Potential new transit signal required at Holland for access to Goldenrod.
Result	Curb Bus Lane Due to the requirement of signal installation at Bayview (and potentially Holland), the curb bus lane option would be less expensive.	

APPENDIX F

Preliminary Proposed Scott Street Bus Lane Configuration (Capital Transit Partners Plan, August 2011)



OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD

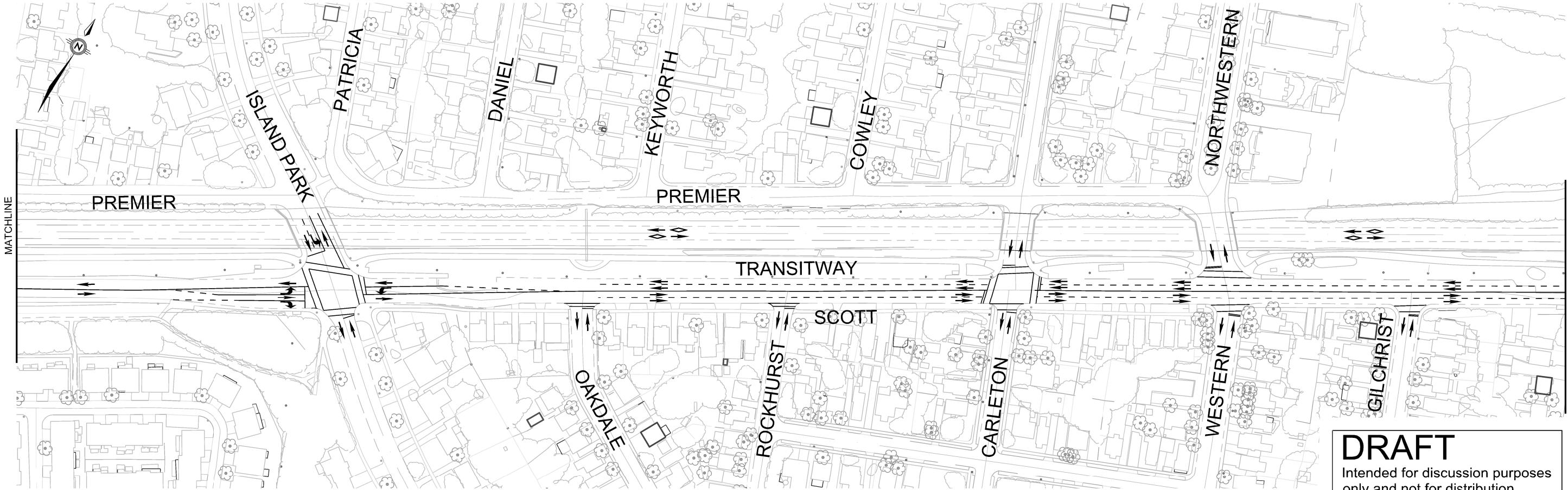
CONSTRUCTION STAGING DETOUR
SCOTT STREET
EXISTING LANE CONFIGURATIONS
SHEET 1 OF 3

Contract No. LRT11-1018	Dwg. No.
Sheet	of
Asset No.	
Asset Group	
Des. IBD	Chk'd.
Dwn. DMB	Chk'd.
Utility Circ. No.	Index No.
Const. Inspector	
Scale: HORIZONTAL 0m 10 20 40	

NOTE:
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CAPITAL TRANSIT PARTNERS

No.	Description	By	Date (dd/mm/yy)

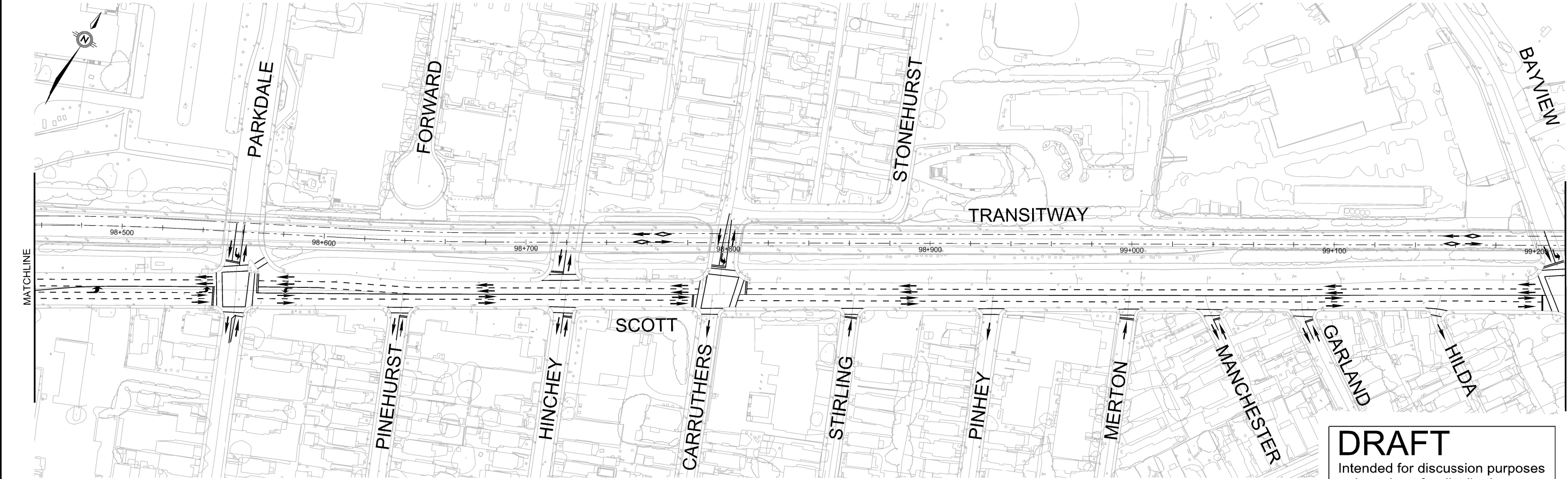
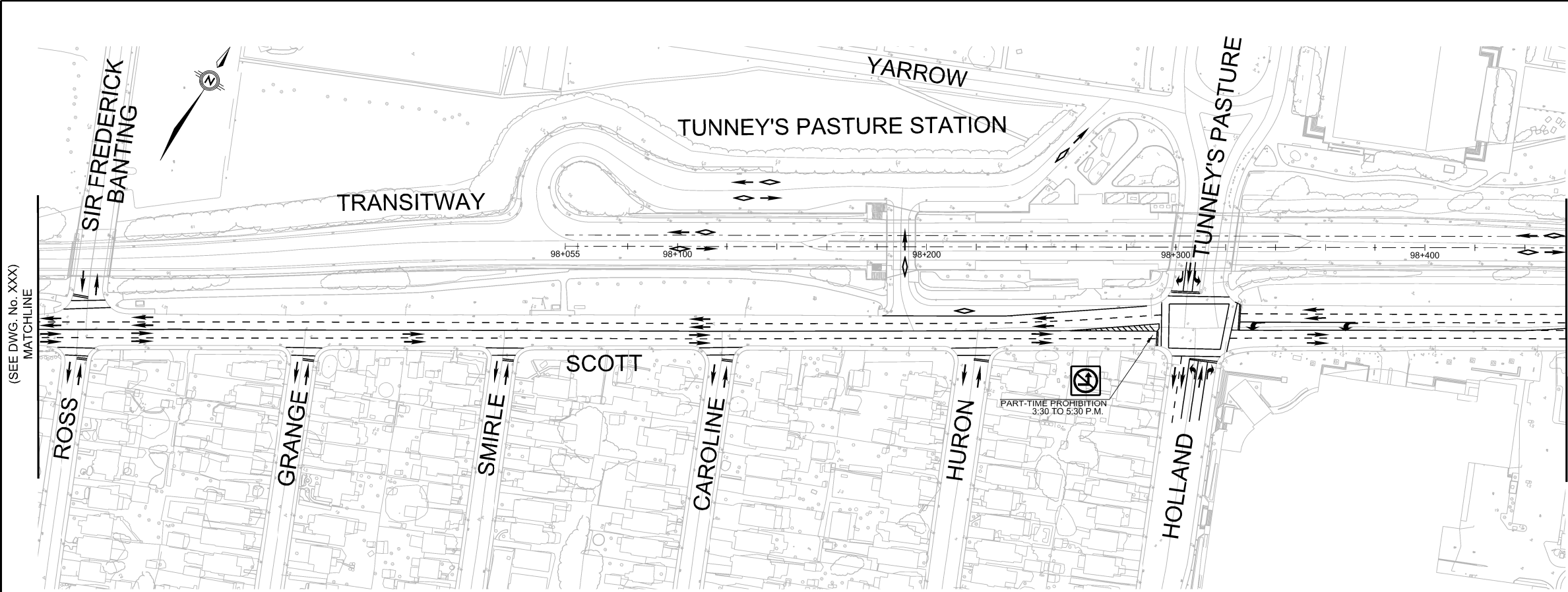


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(SEE DWG. No. XXX)



OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD

CONSTRUCTION STAGING DETOUR
SCOTT STREET
EXISTING LANE CONFIGURATIONS
SHEET 2 OF 3

Contract No.
LRT11-1018

Dwg. No.

Sheet of

Asset No.

Asset Group

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Utility Circ. No.

Index No.

Const. Inspector

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REVISIONS

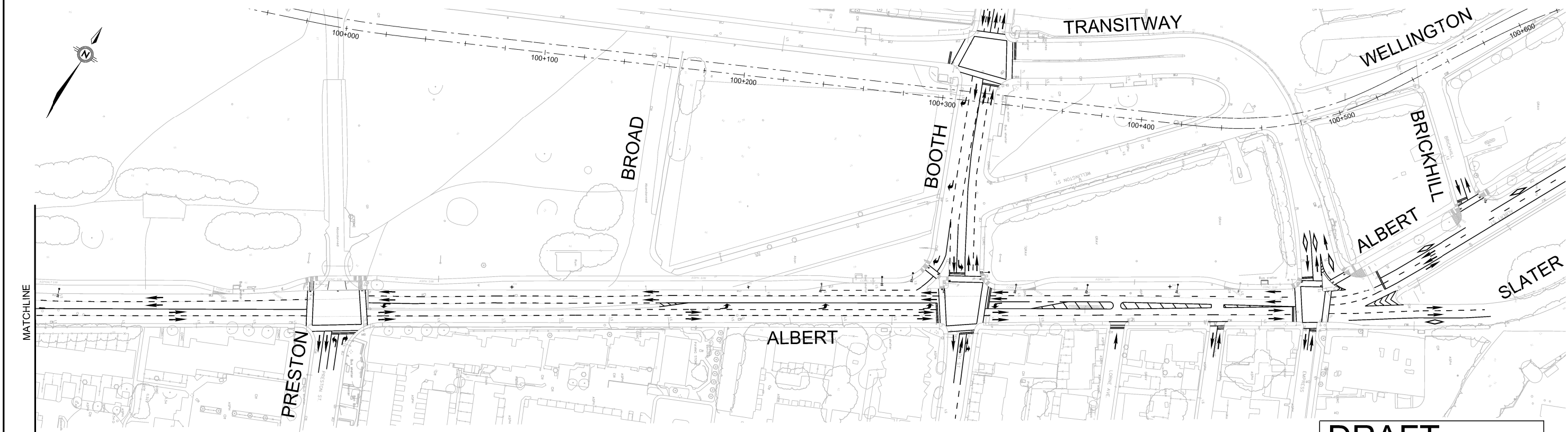
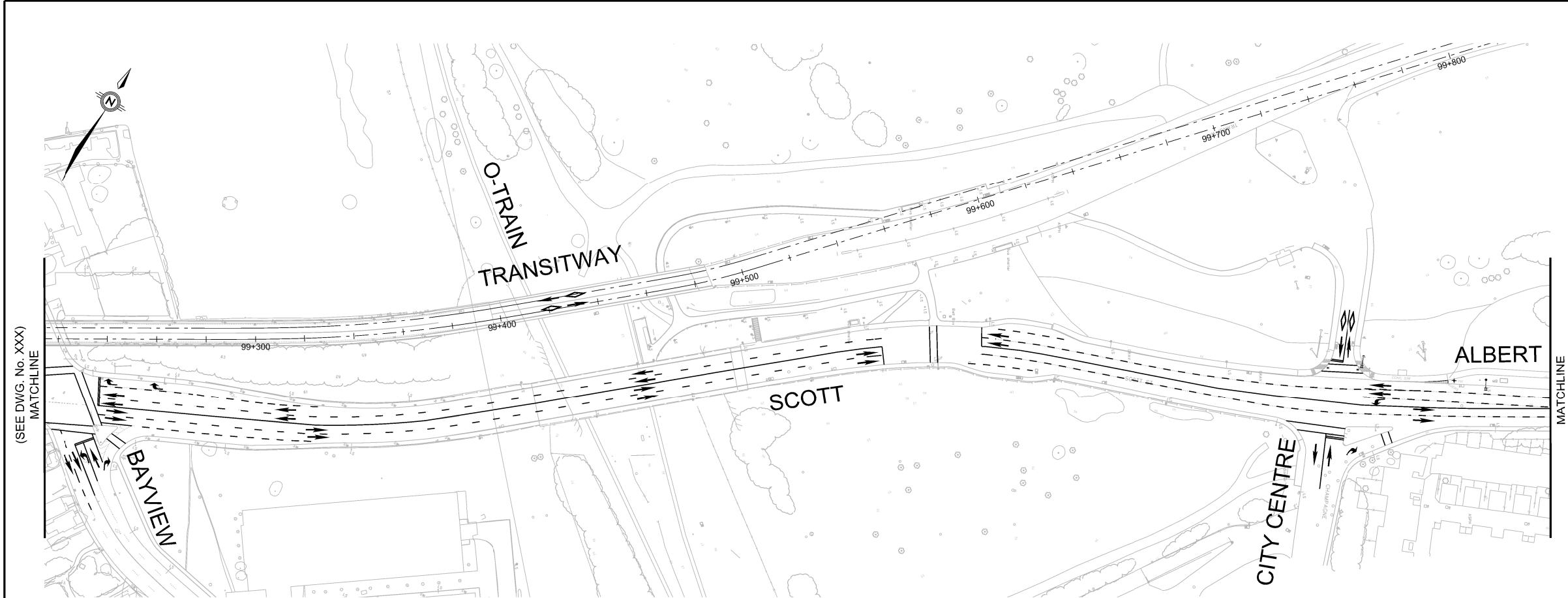
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OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD

CONSTRUCTION STAGING DETOUR
SCOTT STREET
EXISTING LANE CONFIGURATIONS
SHEET 3 OF 3

Contract No.
LRT11-1018

Dwg. No.

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of

Asset No.

Asset Group

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Utility Circ. No.

Index No.

Const. Inspector

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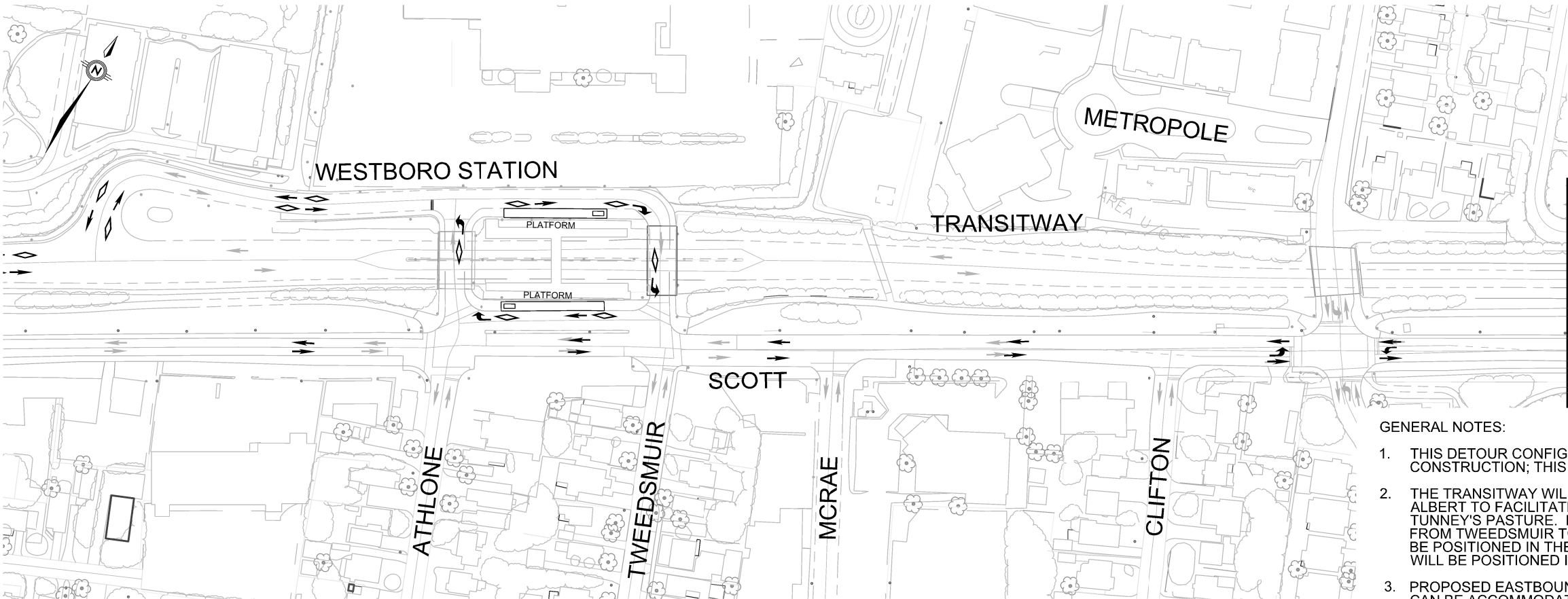
CAPITAL TRANSIT PARTNERS




No.	Description	By	Date (dd/mm/yy)

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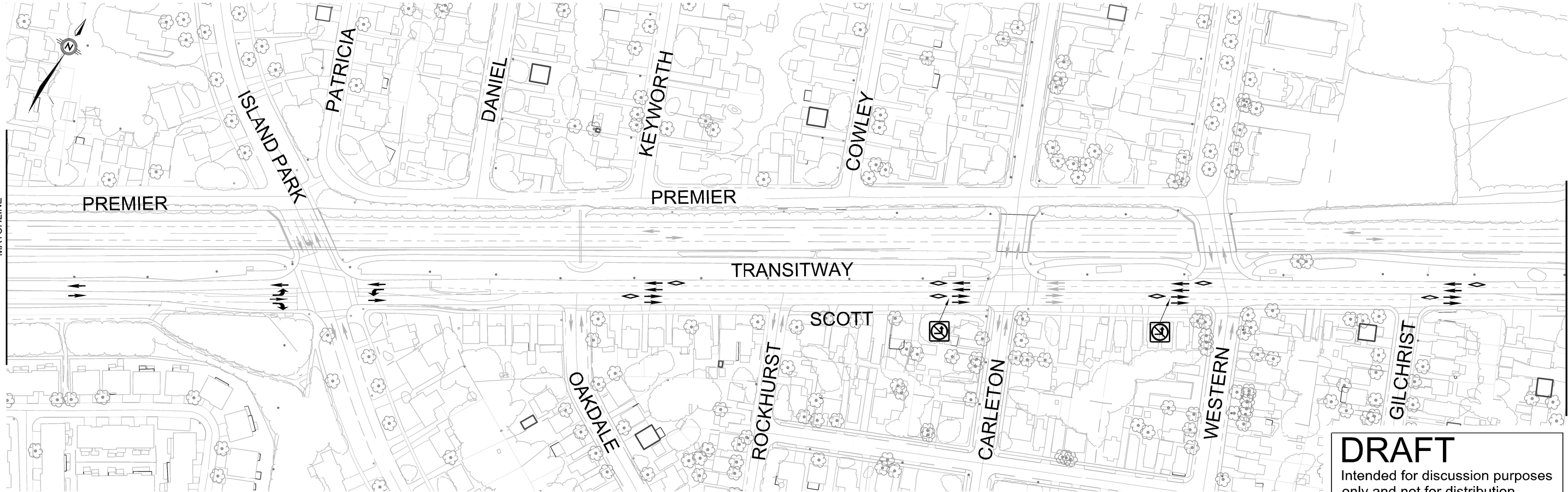
JULY 04, 2011



OTTAWA LIGHT RAIL TRANSIT PROJECT TUNNEY'S PASTURE TO BLAIR ROAD				
CONSTRUCTION STAGING LONG SCOTT DETOUR (PHASE I) SHEET 1 OF 3		Contract No. LRT11-1018	Dwg. No.	
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		Asset No.		
		Asset Group		
		Des. IBD	Chk'd.	
		Dwn. DMB	Chk'd.	
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		Const. Inspector		
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REVISIONS	No.	Description	By	Date (dd/mm/yy)

GENERAL NOTES:

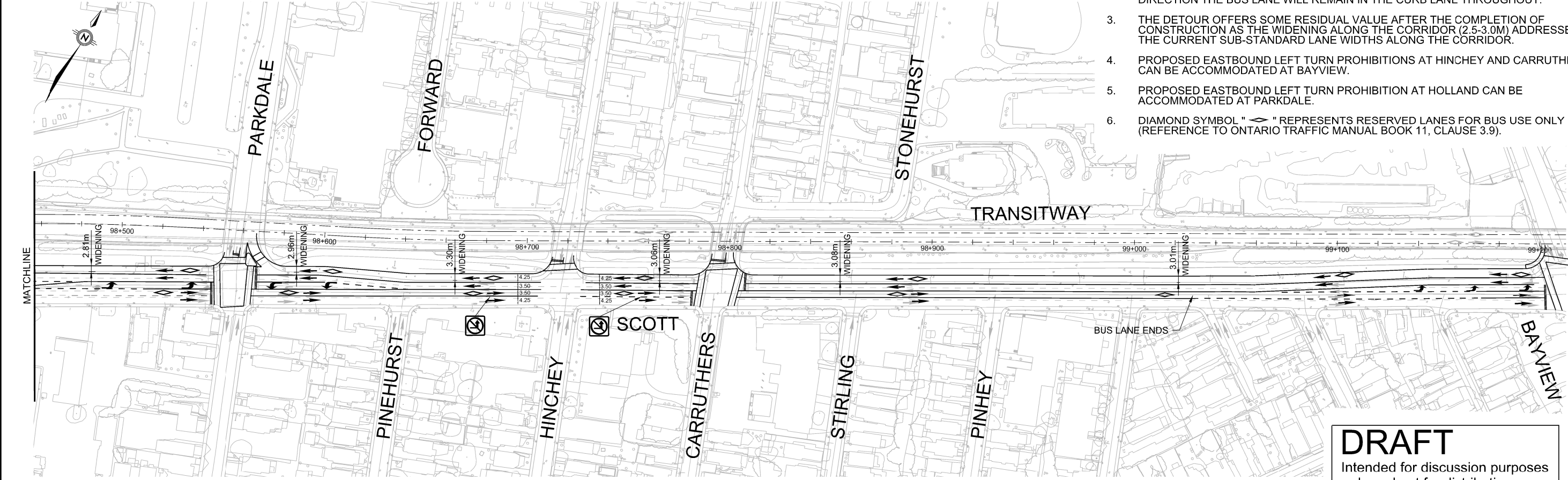
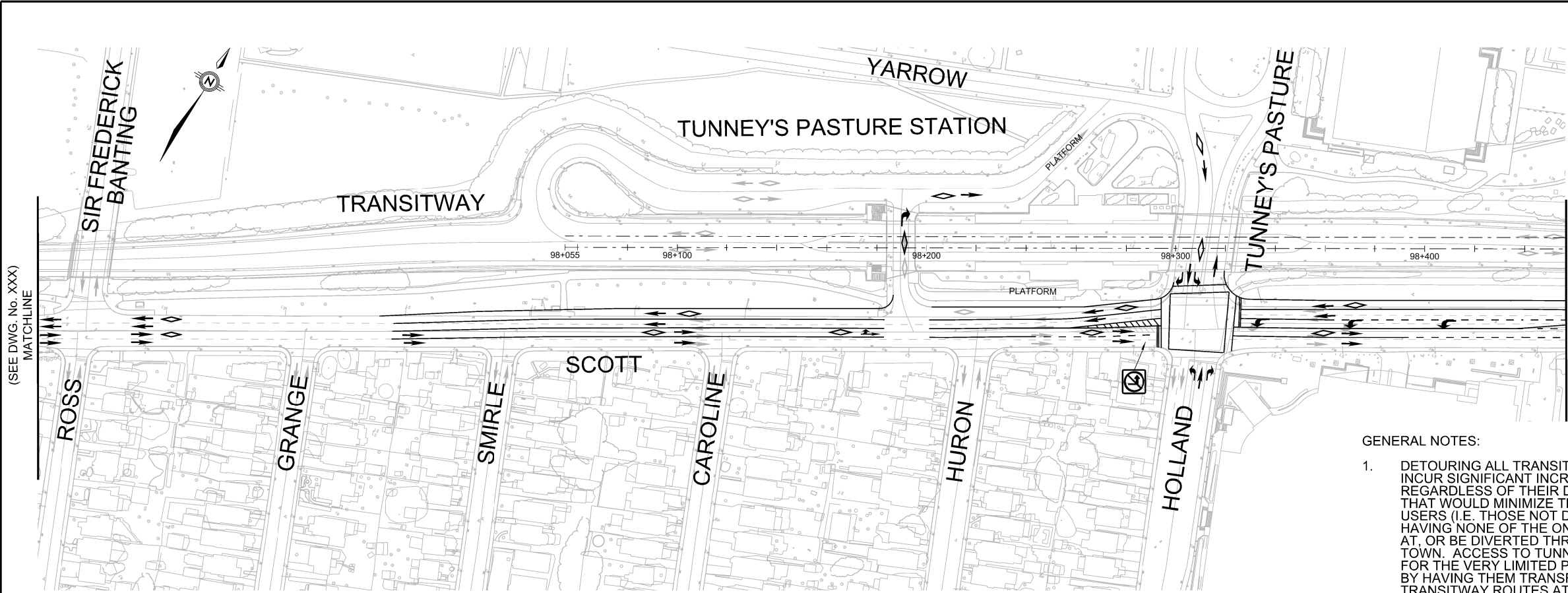
- THIS DETOUR CONFIGURATION IS TO ACCOMMODATE GOLDENROD RAMP CONSTRUCTION; THIS DETOUR IS EXPECTED TO BE IN PLACE FOR 1 MONTH.
- THE TRANSITWAY WILL BE OUT OF SERVICE FROM WESTBORO STATION TO ALBERT TO FACILITATE THE CONSTRUCTION OF THE GOLDENROD RAMP AT TUNNEY'S PASTURE. BUSES WILL BE MIXED WITH GENERAL TRAFFIC ON SCOTT FROM TWEEDSMUIR TO OAKDALE, AFTER WHICH THE EASTBOUND BUSES WILL BE POSITIONED IN THE MEDIAN LANE TO TUNNEY'S AND THE WESTBOUND BUSES WILL BE POSITIONED IN THE CURB LANE FROM TUNNEY'S TO OAKDALE.
- PROPOSED EASTBOUND LEFT TURN PROHIBITIONS AT CARLETON AND WESTERN CAN BE ACCOMMODATED AT PARKDALE.
- DIAMOND SYMBOL "◊" REPRESENTS RESERVED LANES FOR BUS USE ONLY (REFERENCE TO ONTARIO TRAFFIC MANUAL BOOK 11, CLAUSE 3.9)




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GENERAL NOTES:

- DETOURING ALL TRANSITWAY ROUTES THROUGH TUNNEY'S PASTURE WILL INCUR SIGNIFICANT INCREASES IN TRAVEL TIME FOR ALL TRANSIT USERS REGARDLESS OF THEIR DESTINATION. A TRANSIT MANAGEMENT STRATEGY THAT WOULD MINIMIZE THESE ADVERSE CONSEQUENCES TO THE BULK OF USERS (I.E. THOSE NOT DESTINED TO TUNNEY'S PASTURE), IS THAT OF HAVING NONE OF THE ONE-WAY PEAK-PERIOD LIMITED STOP ROUTES STOP AT, OR BE DIVERTED THROUGH TUNNEY'S PASTURE ON ROUTE TO DOWN-TOWN. ACCESS TO TUNNEY'S PASTURE BY THE USERS OF THESE ROUTES FOR THE VERY LIMITED PERIOD OF THE DETOUR, CAN READILY BE PROVIDED BY HAVING THEM TRANSFER TO THE HIGH-FREQUENCY ALL-DAY TWO-WAY TRANSITWAY ROUTES AT EITHER, OR BOTH, LINCOLN FIELDS AND WESTBORO STATION. BOTH STATIONS OFFER A HIGH QUALITY TRANSFER ENVIRONMENT WITH NO GRADE-CHANGE, NO PLATFORM CHANGE, AND WEATHER PROTECTION.
- IN THE EASTBOUND DIRECTION FROM TUNNEY'S TO BAYVIEW THE BUS LANE IS POSITIONED IN THE LEFT LANE TO AVOID FRICTION FROM TURNING MOVEMENTS TO/FROM LAND USES ON THE SOUTH SIDE OF THE CORRIDOR, BEYOND WHICH THE BUS LANE IS MOVED TO THE CURB SIDE. IN THE WESTBOUND DIRECTION THE BUS LANE WILL REMAIN IN THE CURB LANE THROUGHOUT.
- THE DETOUR OFFERS SOME RESIDUAL VALUE AFTER THE COMPLETION OF CONSTRUCTION AS THE WIDENING ALONG THE CORRIDOR (2.5-3.0M) ADDRESSES THE CURRENT SUB-STANDARD LANE WIDTHS ALONG THE CORRIDOR.
- PROPOSED EASTBOUND LEFT TURN PROHIBITIONS AT HINCHEY AND CARRUTHERS CAN BE ACCOMMODATED AT BAYVIEW.
- PROPOSED EASTBOUND LEFT TURN PROHIBITION AT HOLLAND CAN BE ACCOMMODATED AT PARKDALE.
- DIAMOND SYMBOL "  " REPRESENTS RESERVED LANES FOR BUS USE ONLY (REFERENCE TO ONTARIO TRAFFIC MANUAL BOOK 11, CLAUSE 3.9).

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OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD

CONSTRUCTION STAGING
LONG SCOTT DETOUR (PHASE I)
SHEET 2 OF 3

Manager - DivisionProject Manager

Contract No.
LRT11-1018

Dwg. No.

Sheet of

Asset No.

Asset Group

Des. IBDChk'd.


Dwn. DMBChk'd.

Utility Circ. No. Index No.

Const. Inspector

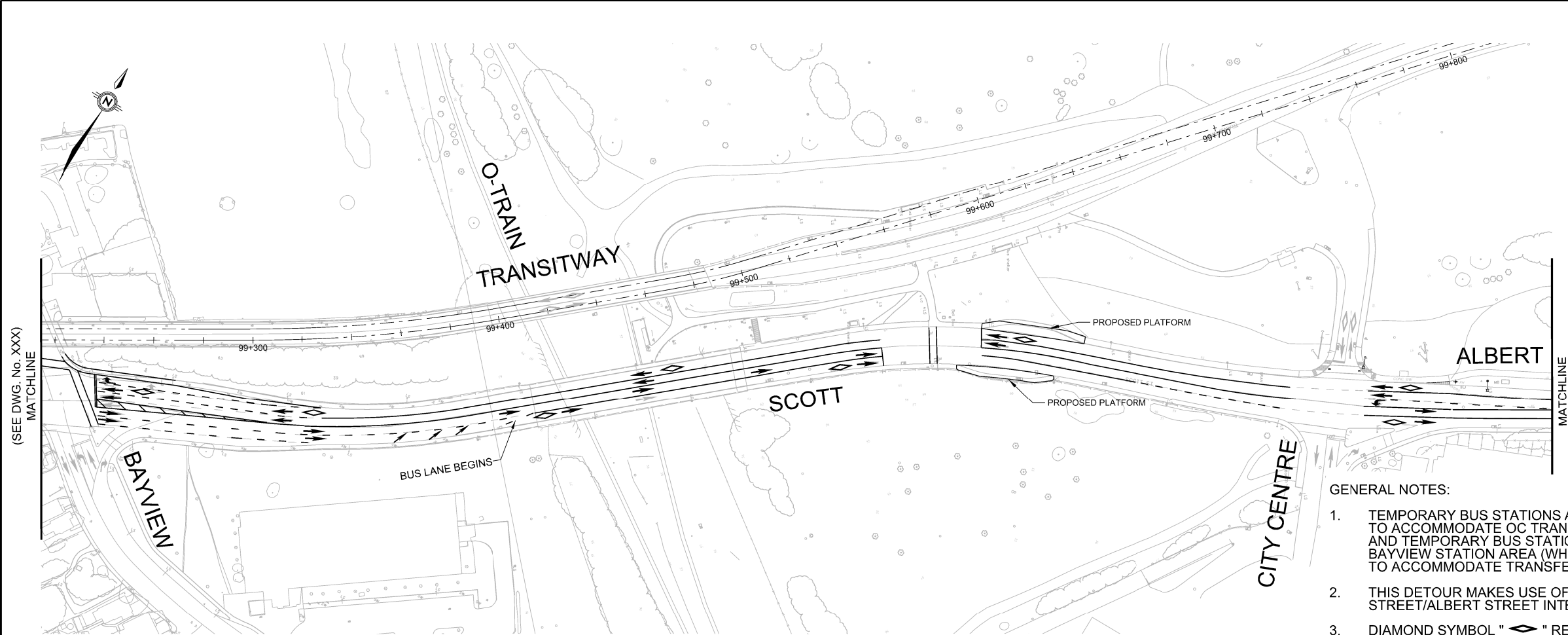
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NOTE:
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CAPITAL TRANSIT PARTNERS

No.	Description	By	Date (dd/mm/yy)

(SEE DWG. No. XXX)



(SEE DWG. No. XXX)
MATCHLINE

MATCHLINE

OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD

CONSTRUCTION STAGING
LONG SCOTT DETOUR (PHASE I)
SHEET 3 OF 3

Manager - DivisionProject Manager

Contract No.
LRT11-1018

Dwg. No.

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Asset Group

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Utility Circ. No. Index No.

Const. Inspector

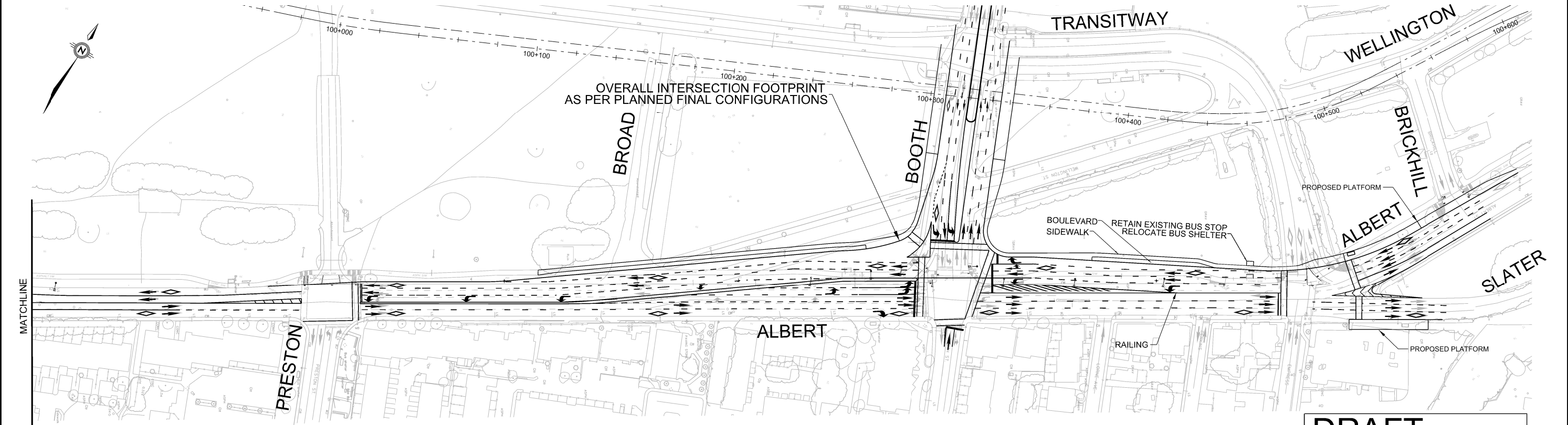
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CAPITAL TRANSIT PARTNERS

No.	Description	By	Date (dd/mm/yy)

- GENERAL NOTES:
- TEMPORARY BUS STATIONS ARE PROVIDED AT THE ALBERT/SLATER INTERSECTION TO ACCOMMODATE OC TRANSPOR INTERPROVINCIAL TRANSFER REQUIREMENTS, AND TEMPORARY BUS STATIONS ARE PROVIDED AT THE EXISTING BAYS AT THE BAYVIEW STATION AREA (WHERE A PEDESTRIAN SIGNAL IS IN PLACE ON SCOTT ST.) TO ACCOMMODATE TRANSFERS TO/FROM THE O-TRAIN.
 - THIS DETOUR MAKES USE OF THE BUILD OUT CONDITIONS AT THE BOOTH STREET/ALBERT STREET INTERSECTION.
 - DIAMOND SYMBOL " " REPRESENTS RESERVED LANES FOR BUS USE ONLY (REFERENCE TO ONTARIO TRAFFIC MANUAL BOOK 11, CLAUSE 3.9).



MATCHLINE

PROPOSED PLATFORM

BOULEVARD SIDEWALK

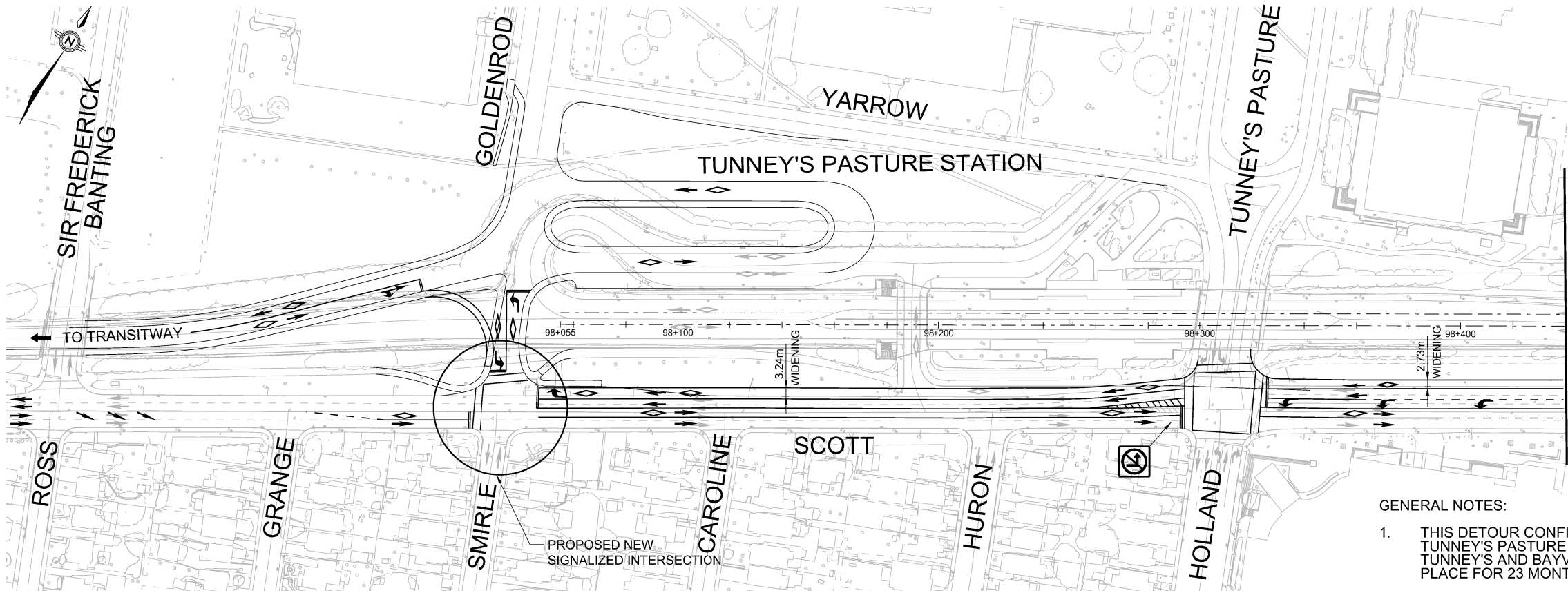
RETAIN EXISTING BUS STOP
RELOCATE BUS SHELTER


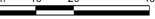

RAILING

PROPOSED PLATFORM

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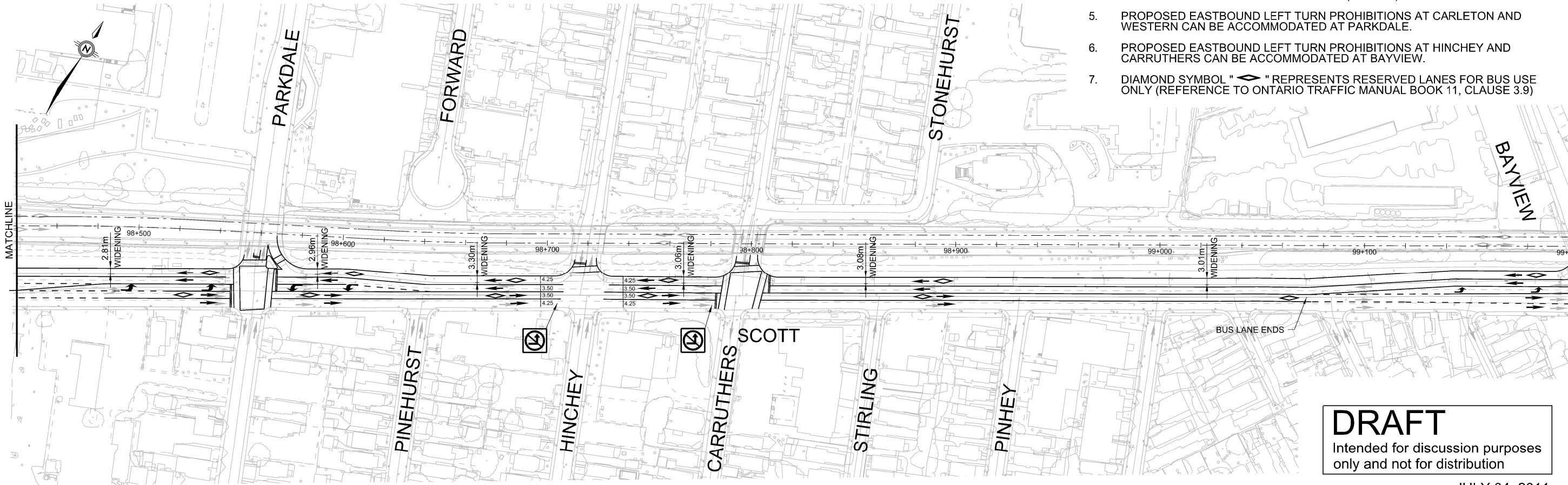
JULY 04, 2011



OTTAWA LIGHT RAIL TRANSIT PROJECT TUNNEY'S PASTURE TO BLAIR ROAD				
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		Sheet	of	
		Asset No.		
Manager - Division		Project Manager		
		Asset Group		
		Des.	IBD	
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REVISIONS	No.	Description	By	Date (dd/mm/yy)

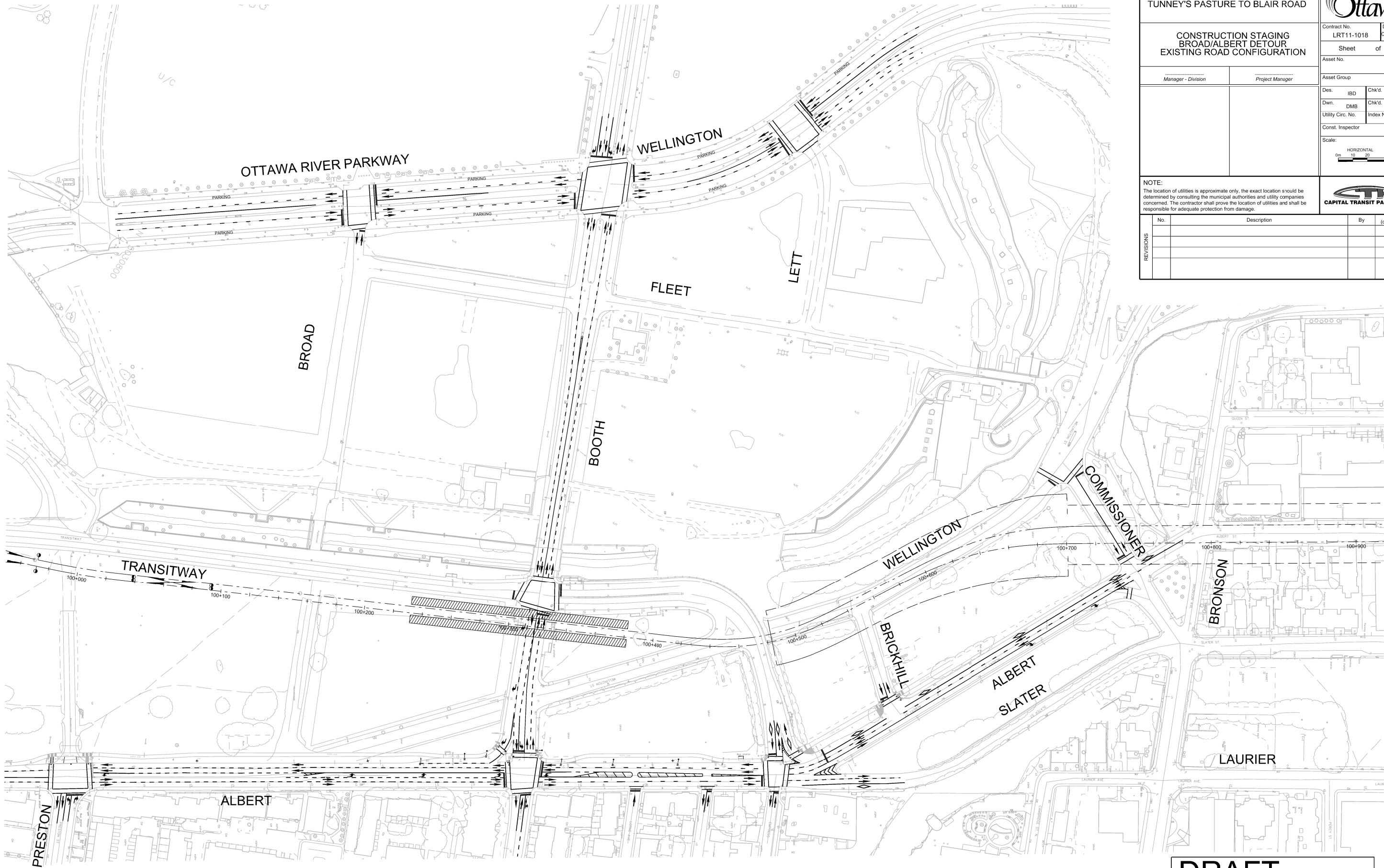
GENERAL NOTES:



- THIS DETOUR CONFIGURATION IS TO ACCOMMODATE TRACK WORK FROM TUNNEY'S PASTURE TO TUNNEL WEST PROTAL AT ALBERT/SLATER; AS WELL AS TUNNEY'S AND BAYVIEW STATION FIT-OUT. THE DETOUR IS EXPECTED TO BE IN PLACE FOR 23 MONTHS.
- THIS DETOUR ASSUMES THAT THE GOLDENROD RAMP IS IN PLACE. WEST OF GOLDENROD BUS RAMP, BUSES ARE MAINTAINED IN THE TRANSITWAY AND CONNECT TO SCOTT STREET VIA THE GOLDENROD RAMP.
- REMOVE ALL PAVEMENT MARKING MODIFICATIONS INTRODUCED IN LONG SCOTT DETOUR WEST OF TUNNEY'S.
- EAST OF TUNNEY'S, DETOUR ARRANGEMENT IN SHORT SCOTT DETOUR (PHASE II) IS IDENTICAL TO LONG SCOTT DETOUR (PHASE I).
- PROPOSED EASTBOUND LEFT TURN PROHIBITIONS AT CARLETON AND WESTERN CAN BE ACCOMMODATED AT PARKDALE.
- PROPOSED EASTBOUND LEFT TURN PROHIBITIONS AT HINCHEY AND CARRUTHERS CAN BE ACCOMMODATED AT BAYVIEW.
- DIAMOND SYMBOL " " REPRESENTS RESERVED LANES FOR BUS USE ONLY (REFERENCE TO ONTARIO TRAFFIC MANUAL BOOK 11, CLAUSE 3.9)



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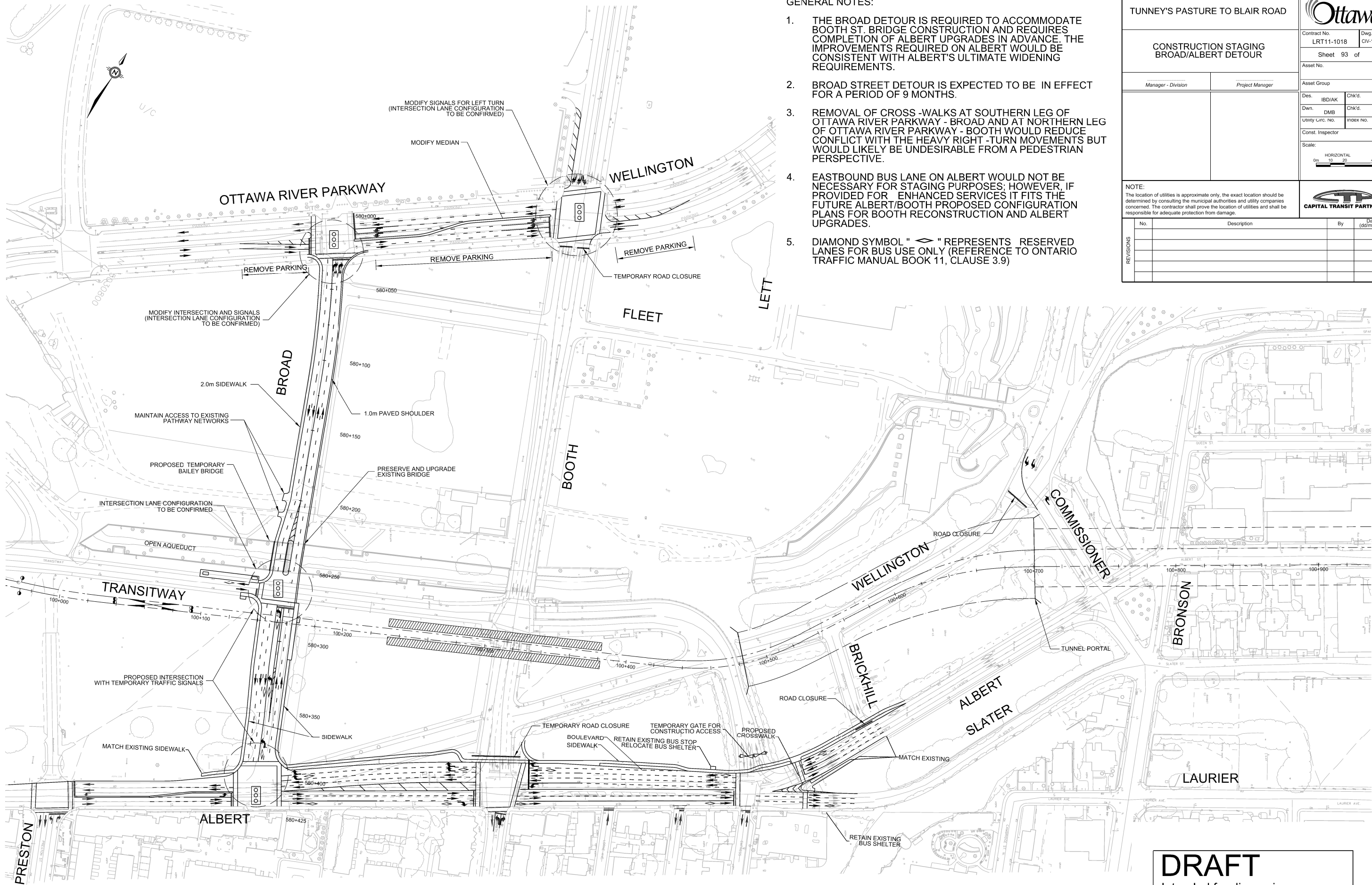
JULY 04, 2011




OTTAWA LIGHT RAIL TRANSIT PROJECT TUNNEY'S PASTURE TO BLAIR ROAD				
CONSTRUCTION STAGING BROAD/ALBERT DETOUR EXISTING ROAD CONFIGURATION		Contract No. LRT11-1018	Dwg. No. CIV-1-CT-030	
		Sheet of		
		Asset No.		
		Asset Group		
<i>Manager - Division</i>		<i>Project Manager</i>		
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REVISIONS	No.	Description	By	Date (dd/mm/yy)

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GENERAL NOTES:

1. THE BROAD DETOUR IS REQUIRED TO ACCOMMODATE BOOTH ST. BRIDGE CONSTRUCTION AND REQUIRES COMPLETION OF ALBERT UPGRADES IN ADVANCE. THE IMPROVEMENTS REQUIRED ON ALBERT WOULD BE CONSISTENT WITH ALBERT'S ULTIMATE WIDENING REQUIREMENTS.
2. BROAD STREET DETOUR IS EXPECTED TO BE IN EFFECT FOR A PERIOD OF 9 MONTHS.
3. REMOVAL OF CROSS -WALKS AT SOUTHERN LEG OF OTTAWA RIVER PARKWAY - BROAD AND AT NORTHERN LEG OF OTTAWA RIVER PARKWAY - BOOTH WOULD REDUCE CONFLICT WITH THE HEAVY RIGHT -TURN MOVEMENTS BUT WOULD LIKELY BE UNDESIRABLE FROM A PEDESTRIAN PERSPECTIVE.
4. EASTBOUND BUS LANE ON ALBERT WOULD NOT BE NECESSARY FOR STAGING PURPOSES; HOWEVER, IF PROVIDED FOR ENHANCED SERVICES IT FITS THE FUTURE ALBERT/BOOTH PROPOSED CONFIGURATION PLANS FOR BOOTH RECONSTRUCTION AND ALBERT UPGRADES.
5. DIAMOND SYMBOL "  " REPRESENTS RESERVED LANES FOR BUS USE ONLY (REFERENCE TO ONTARIO TRAFFIC MANUAL BOOK 11, CLAUSE 3.9)

OTTAWA LIGHT RAIL TRANSIT PROJECT
TUNNEY'S PASTURE TO BLAIR ROAD



CONSTRUCTION STAGING
BROAD/ALBERT DETOUR

Contract No.
LRT11-1018

Dwg. No.
CIV-1-CT-...

Sheet 93 of

Asset No.

Manager - Division

Project Manager

Asset Group

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Dwn. DMB Chk'd.

Utility Circ. No. insex No.

Const. Inspector

Scale:

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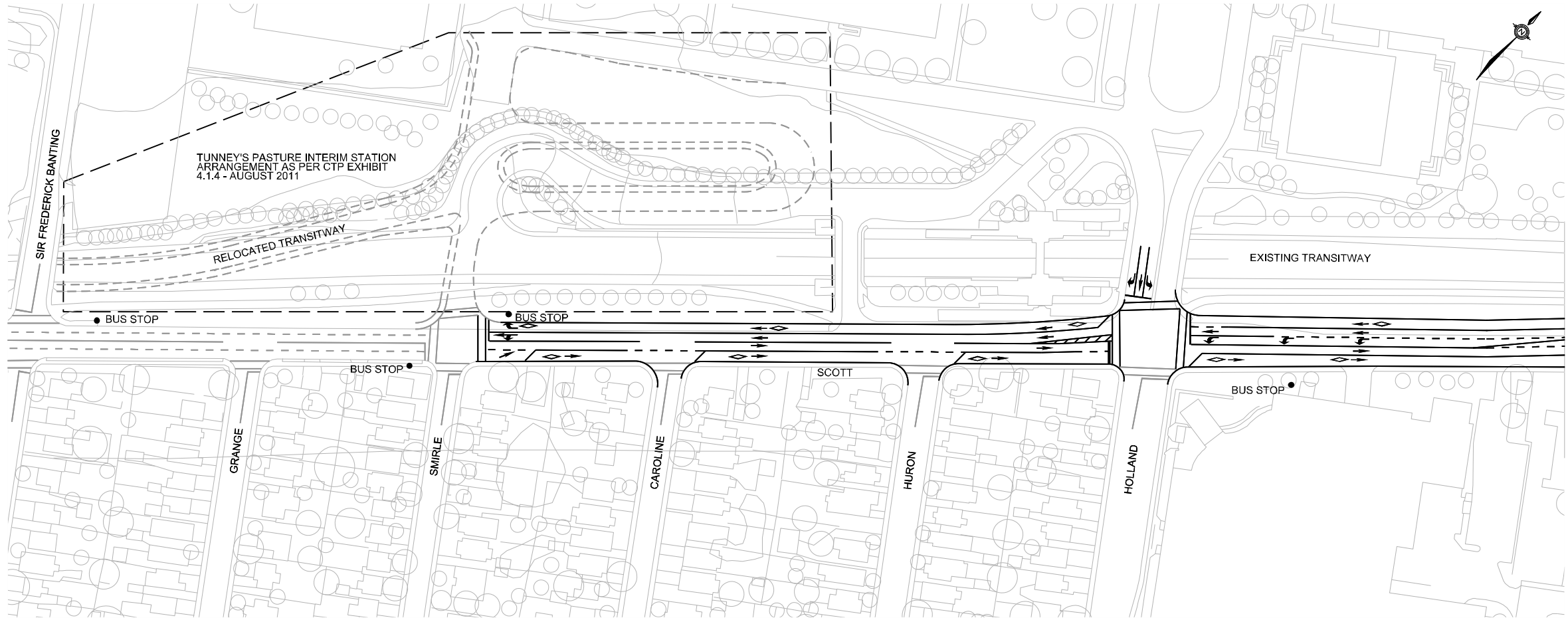
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JULY 04, 2011

APPENDIX G

Recommended Scott Street Bus Lane Configuration



OTTAWA LIGHT RAIL TRANSIT
CONSTRUCTION DETOURS
FOR THE WEST END

SCOTT STREET BUS
LANE CONCEPT



Contract No. Dwg. No.
001

Sheet 01 of 02

Asset No.

Asset Group

Des. MB Chkd.

Dwn. JS Chkd.

Utility Circ. No. Index No.

Const. Inspector

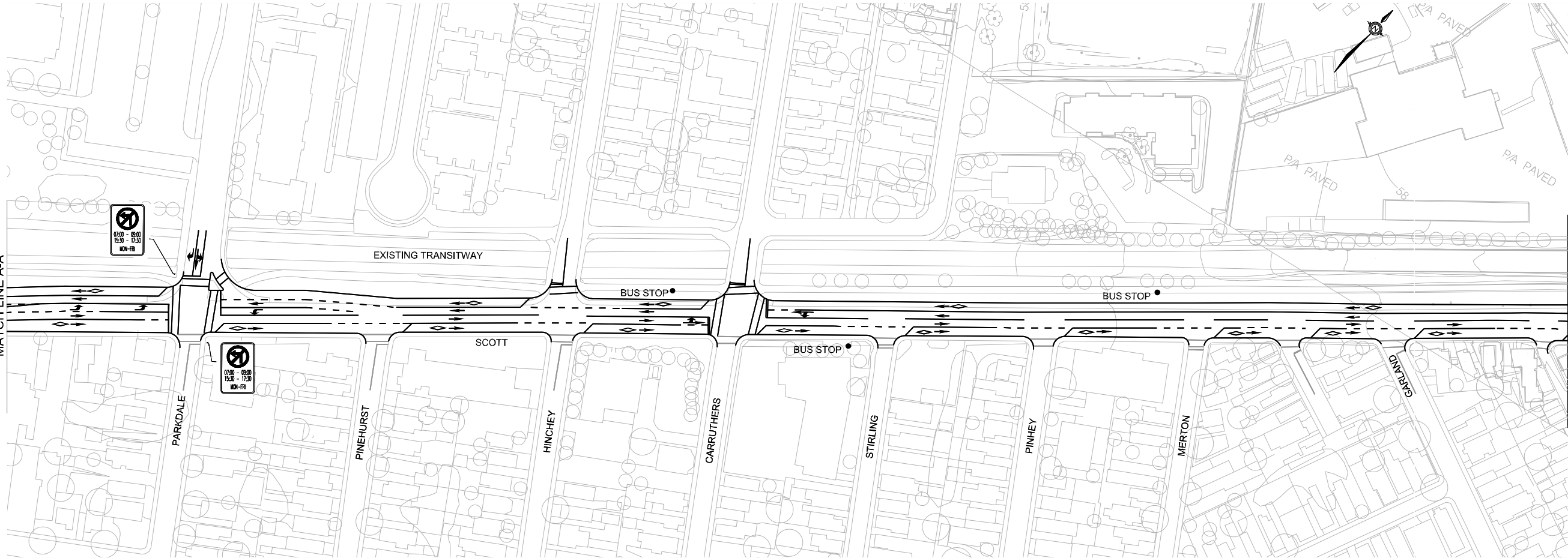
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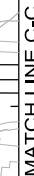
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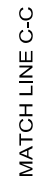
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CONSTRUCTION

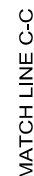




NOT FOR
CONSTRUCTION



CTP DETOUR LANE ARRANGEMENT - EXHIBIT 3 - JULY 4, 2011



MRC'S MODIFICATION TO CTP'S ALTERNATIVE