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## MEMO

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**DATE:** January 29, 2009  
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**OUR FILE:** WO 106959  
**SUBJECT:** Yonge Subway Extension  
Langstaff Commuter Parking Facility Traffic Impacts

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### Introduction

The traffic impact of introducing a commuter parking facility in the southwest quadrant of the Highway 407 interchange at Yonge Street is being assessed as part of the overall environmental assessment being undertaken for the Yonge Subway Extension. This technical memorandum provides preliminary feedback regarding the on-going traffic analysis for the purpose of keeping area residents informed. This feedback describes the assumptions adopted as part of the analysis and summarizes the impacts identified to-date.

### Facility Trip Generation

Traffic counts were undertaken at each of the driveways serving the Finch Subway Station commuter parking lot as well as the adjacent passenger pick-up and drop-off facility to establish a basis for estimating the trip generation at the proposed facility immediately south of Highway 407. The trip generation of the proposed parking lot was assumed to be proportional to the number of trips generated by the Finch lots on the basis of the relative number of parking spaces provided. The combined parking supply at the two Finch station parking lots is 3,214 spaces. The proposed number of parking spaces at the Langstaff station is 61% of this supply or 1,965 stalls. Based on the current known constraints, this is the maximum supply that can be provided on the site. The trip generation of the proposed passenger pick-up and drop-off area was assumed to be equal to 50% of the observed demand at the Finch station, recognizing that similar facilities are proposed at Steeles Avenue and north of Highway 7.

The summary provided in *Exhibit 1* identifies the observed trip generation at the Finch Subway station and the estimated trip generation at the Langstaff station. We note that the afternoon peak trip generation hour of the proposed facility coincides with the peak hour for adjacent street traffic. However, the morning peak trip generation hour for the commuter parking facility (7:00 to 8:00 a.m.) is earlier than the peak hour for adjacent street traffic (8:00 to 9:00 a.m.). Accordingly, traffic analysis was carried out to reflect impacts during each of these peak hours.

**Exhibit 1 Trip Generation**

Period	Commuter Parking Lot			Passenger Pick-Up/Drop-Off		
	In	Out	Total	In	Out	Total
<i>Finch Subway Station</i>						
7-8 AM Peak Hour (facility peak)	1,672	12	1,684	230	230	460
8-9 AM Peak Hour	534	13	547	266	266	532
PM Peak Hour	118	975	1,093	350	350	700
<i>Langstaff Subway Station</i>						
7-8 AM Peak Hour (facility peak)	1,020	8	1,028	115	115	230
8-9 AM Peak Hour	325	8	333	134	134	268
PM Peak Hour	72	595	667	175	175	350

**Facility Trip distribution**

The assumed distribution of trips arriving at and departing from the proposed commuter parking lot was also established on the basis of travel patterns observed at the Finch station. The *2004 Finch Station Commuter Parking Lot Survey* established the origin of trips to the station by Canada Post’s Forward Sortation Area (FSA) i.e. the first three characters of the postal code. *Exhibit 2* provides a summary of the distribution of these trips and reflects a reasonable assumption of the orientation of traffic based on drivers’ trip origins. This distribution pattern was ‘translated’ northward to reflect a similar travel pattern for commuter parking lot traffic generated by the Langstaff station, which is also provided in *Exhibit 2*. For example, the same proportion of traffic that approaches the Finch Station from the east and west between Highway 401 and Steeles Avenue is also assumed to approach the Langstaff Station from the east and west between John Street and Rutherford Road. Similarly, the proportion of traffic that will approach the Langstaff Station from south of John Street is assumed to be the same as the proportion of traffic that currently approaches the Finch Station from south of Highway 401.

**Exhibit 2 General Trip Distribution of Commuter Parking Lot Traffic**

Direction of Approach	Proportion of Trips
<i>Finch Commuter Parking Lot Distribution</i>	
From the east between Hwy 401 and Steeles Avenue	23%
From the west between Hwy 401 and Steeles Avenue	15%
From the south of Highway 401	8%
From the north between Bathurst Avenue and Hwy 404	32%
From the northwest i.e. north of Steeles Avenue /west of Bathurst Street	10%
From the northeast i.e. north of Steeles/east of Hwy 404	12%

**Exhibit 2 (Cont'd) General Trip Distribution of Commuter Parking Lot Traffic**

Direction of Approach	Proportion of Trips
<i>Langstaff Commuter Parking Lot Distribution Assumptions</i>	
From the east between John Street and Rutherford Road/16th Avenue	23%
From the west between John Street and Rutherford Road/16th Avenue	15%
From the south of John Street	8%
From the north between Bathurst Avenue and Hwy 404	32%
From the northwest i.e. north of Rutherford/west of Bathurst Street	10%
From the northeast i.e. north of 16th Avenue/east of Hwy 404	12%

In the absence of available data to describe existing Finch Station passenger pick-up/drop-off travel patterns, the corresponding travel patterns at the Langstaff Station were assumed to be the same as those of the commuter parking lot.

A further inspection of the general travel patterns described in *Exhibit 2* in the context of the surrounding road network and distribution of residential development provided the basis for establishing the detailed distribution patterns applied in assigning this traffic to the study-area road network. While the allocation provided in *Exhibit 2* reflects a geographical distribution of trip origins, the allocation in *Exhibit 3* reflects the assumed travel routes between these origins and the planned Langstaff Station. Traffic originating from all origins based on the geographic distribution described in *Exhibit 2* must approach the site from Highway 7, Highway 407 or Yonge Street north or south of these highway corridors. Appropriate judgement was applied in establishing which route(s) would be used in this regard.

**Exhibit 3 Traffic Assignment Trip Distribution**

Direction of Approach	Proportion of Trips
To/from the south on Yonge Street	16%
To/from the east on Highway 407	19%
To/from the west on Highway 407	12%
To/from the east on Highway 7	21%
To/from the west on Highway 7	13%
To/from the north on Yonge Street	19%

**Diversion of Existing Commuter Parking Traffic**

The traffic analysis accounts for existing commuter parking traffic generated by the Finch Station that will potentially be diverted to the proposed Langstaff parking facility. A review of the travel patterns based on the *2004 Finch Station Commuter Parking Lot Survey* and recent intersection traffic counts at each of the parking lot driveways indicates that, in fact, less than 10% of this existing commuter parking traffic generation currently approaches the Finch Station from Yonge Street north of the proposed Langstaff Station. Nevertheless, the assignment of the

estimated travel demand generated by the Langstaff Station took this into account by discounting through traffic volumes at the planned commuter parking entrance. This low proportion is a reflection on the routes used to approach the Finch Station rather than the origin of the trips.

### Study Area Traffic Volumes

The traffic analysis was undertaken to reflect impacts along Yonge Street between High Tech Road and Royal Orchard Boulevard. The attached *Exhibits 4 and 5* summarize the existing intersection turning movement volumes in this corridor. Morning peak hour turning movement volumes are provided for both the peak hour of the commuter parking lot (7:00 to 8:00 a.m.) and the peak hour of adjacent street traffic (8:00 to 9:00 a.m.). *Exhibits 6 and 7* summarize the projected commuter parking lot and passenger pick-up and drop-off traffic volumes generated by the proposed Langstaff Station based on the assumptions described above. *Exhibits 8 and 9* summarize the total traffic volumes based on the sum of the existing volumes and the projected demand generated by the Langstaff Station, while also accounting for the diversion of existing commuter parking traffic originating from/destined to the Finch Station.

The level-of-service analysis confirms that the traffic generated by the planned commuter parking facility utilizes a significant proportion of available reserve capacity along Yonge Street between Garden Avenue and the planned commuter parking entrance. Although traffic generated by the proposed development of Langstaff Gateway and Richmond Hill Centre has not yet been clearly identified, further traffic analysis will be required once details become available.

### Capacity and Level of Service Analysis

Intersection capacity and level-of-service analysis was carried out to assess existing operating conditions and estimate the relative impact of increased study-area traffic generated by the proposed Langstaff commuter parking and passenger pick-up and drop-off facilities. Analysis undertaken using the *Synchro 7* software suite establishes the degree of capacity utilization and provides volume-to-capacity ratios for individual intersection movements. Detailed micro-simulation analysis identifies average vehicle delays and 95th percentile queue lengths as a reflection of the level of service impacts throughout the study area. *Exhibits 10 and 11* summarize the existing and projected capacity and level-of-service impacts, respectively.

### Exhibit 10 Existing Intersection Levels of Service

Intersection/Movement	Level of Service											
	Weekday A.M. Peak Hour 7-8AM				Weekday A.M. Peak Hour 8-9AM				Weekday P.M. Peak Hour			
	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>
<i>High Tech Rd at Yonge St</i>												
Eastbound Left/Through/Right	0.01	0/0/5 s	A/A/A	0 m	0.03	0/33/6 s	A/C/A	0 m	0.05	46/16/5 s	D/B/A	1 m
Westbound Left	0.65	55 s	D	39 m	0.73	51 s	D	53 m	0.72	52 s	D	50 m
Westbound Through/Right	0.10	0/5 s	A/A	6 m	0.33	24/5 s	C/A	7 m	0.51	31/8 s	C/A	14 m
Northbound Left	0.02	33 s	C	0 m	0.18	32 s	C	0 m	0.00	17 s	B	0 m
Northbound Through/Right	0.25	4/4 s	A/A	18 m	0.42	6/5 s	A/A	26 m	0.74	15/18 s	B/B	175 m
<b>Southbound Left</b>	0.32	10 s	A	10 m	0.51	20 s	B	17 m	<b>1.10</b>	25 s	C	28 m
Southbound Through/Right	0.71	6/2 s	A/A	72 m	0.82	10/5 s	A/A	118m	0.44	6/5 s	A/A	42 m

Note: 1. Queue length reflects 95th percentile conditions

**Exhibit 10 (Cont'd) Existing Intersection Levels of Service**

Intersection/Movement	Level of Service											
	Weekday A.M. Peak Hour 7-8AM				Weekday A.M. Peak Hour 8-9AM				Weekday P.M. Peak Hour			
	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>
<i>Garden Ave at Yonge St</i>												
Eastbound Left	0.48	58 s	E	25 m	0.71	68 s	E	56 m	0.36	60 s	E	18 m
Eastbound Through	0.31	58 s	E	19 m	0.52	62 s	E	57 m	0.21	64 s	E	12 m
Eastbound Right	0.61	10 s	A	14 m	0.98	18 s	B	34 m	0.40	7 s	A	7 m
Westbound Left/Through	0.71	55/59 s	D/E	54 m	0.80	50/53 s	D/D	93 m	0.85	51/53 s	D/D	114 m
Westbound Right	0.38	1 s	A	0 m	0.39	1 s	A	0 m	0.55	2 s	A	0 m
Northbound Left	0.43	23 s	C	13 m	0.92	43 s	D	38 m	1.09	41 s	D	59 m
Northbound Through	0.24	18 s	B	36 m	0.46	25 s	C	58 m	0.85	32 s	C	180 m
Northbound Right	0.31	1 s	A	0 m	0.61	3 s	A	0 m	0.43	11 s	B	0 m
Southbound Left	0.49	12 s	B	25 m	0.89	29 s	C	51 m	1.14	39 s	D	41 m
Southbound Through/Right	0.70	14/11 s	B/B	74 m	0.99	25/24 s	C/C	151m	0.56	16/11 s	B/B	53 m
<i>Hwy 407 E-N/S Ramp at Yonge St</i>												
Westbound Left	0.51	56 s	E	25 m	0.52	53 s	D	32 m	0.24	54 s	D	26 m
Westbound Right	0.41	6 s	A	0 m	0.73	8 s	A	13 m	0.84	11 s	B	20 m
Northbound Through	0.22	4 s	A	20 m	0.42	6 s	A	38 m	0.67	3 s	A	25 m
Southbound Through	0.48	4 s	A	42 m	0.62	4 s	A	31 m	0.47	9 s	A	67 m
<i>Hwy 407 W-N/S Ramp at Yonge St</i>												
Eastbound Left/Through	0.48	55/56 s	D/E	31 m	0.33	52/49 s	D/D	33 m	0.72	48/47 s	D/D	62 m
Eastbound Right	0.75	7 s	A	14 m	0.94	10 s	A	28 m	0.88	8 s	A	21 m
Westbound Left	0.46	59 s	E	20 m	0.46	57 s	E	19 m	0.72	60 s	E	25 m
Westbound Right	0.41	6 s	A	0 m	0.55	7 s	A	2 m	0.68	8 s	A	12 m
Northbound Through/Right	0.37	7/5 s	A/A	32 m	0.79	10/8 s	A/A	69 m	0.91	13/11 s	B/B	77 m
Southbound Left	0.33	19 s	B	11 m	0.60	32 s	C	14 m	0.57	40 s	D	21 m
Southbound Through	0.54	8 s	A	54 m	0.75	12 s	B	71 m	0.57	12 s	B	73 m
<i>Cemetery Access at Yonge St</i>												
Westbound Left/Right	-	0/9 s	A/A	0 m	-	0/10 s	A/A	0 m	-	0/17 s	A/C	1 m
Northbound Through/Right	-	0/0 s	A/A	0 m	-	0/0 s	A/A	24 m	-	0/0 s	A/A	6 m
Southbound Left	-	9 s	A	0 m	-	15 s	B	0 m	-	36 s	E	6 m
Southbound Through	-	2 s	A	0 m	-	2 s	A	0 m	-	1 s	A	0 m
<i>Longbridge Rd at Yonge St</i>												
Eastbound Left/Right	-	34/18 s	D/C	7 m	-	63/33 s	E/D	14 m	-	36/16 s	E/C	7 m
Northbound Left	-	24 s	C	3 m	-	34 s	D	4 m	-	21 s	C	2 m
Northbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	0 s	A	0 m
Southbound Through	-	2 s	A	0 m	-	2 s	A	0 m	-	1 s	A	0 m
Southbound Right	-	3 s	A	0 m	-	3 s	A	0 m	-	2 s	A	0 m
<i>Plaza Access at 8281 Yonge St</i>												
Westbound Left	-	30 s	D	8 m	-	49 s	E	13 m	-	47 s	E	9 m
Westbound Right	-	10 s	A	8 m	-	14 s	B	13 m	-	17 s	C	9 m
Northbound Through/Right	-	0/1 s	A/A	0 m	-	0/2 s	A/A	0 m	-	0/1 s	A/A	0 m
Southbound Left	-	8 s	A	5 m	-	17 s	C	11 m	-	25 s	D	6 m
Southbound Through	-	2 s	A	0 m	-	2 s	A	0 m	-	1 s	A	0 m
<i>Bunker Rd at Yonge St</i>												
Eastbound Left/Right	-	21/0 s	C/A	0 m	-	41/30 s	E/D	6 m	-	32/2 s	D/A	0 m
Northbound Left	-	3 s	A	0 m	-	34 s	D	4 m	-	20 s	C	4 m
Northbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	0 s	A	0 m
Southbound Through	-	0 s	A	0 m	-	1 s	A	0 m	-	0 s	A	0 m
Southbound Right	-	1 s	A	0 m	-	1 s	A	0 m	-	1 s	A	0 m

Note: 1. Queue length reflects 95th percentile conditions

**Exhibit 10 (Cont'd) Existing Intersection Levels of Service**

Intersection/Movement	Level of Service											
	Weekday A.M. Peak Hour 7-8AM				Weekday A.M. Peak Hour 8-9AM				Weekday P.M. Peak Hour			
	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>
<i>Kirk Dr at Yonge St</i>												
Eastbound Left/Through/Right	-	0/0/0 s	A/A/A	0 m	-	0/0/0 s	A/A/A	0 m	-	0/0/0 s	A/A/A	0 m
Westbound Left/Through/Right	-	21/0/11 s	C/A/B	7 m	-	36/0/16 s	E/A/C	9 m	-	36/0/19 s	E/A/C	7 m
Northbound Left	-	0 s	A	0 m	-	0 s	A	0 m	-	0 s	A	0 m
Northbound Through/Right	-	0/0 s	A/A	0 m	-	0/1 s	A/A	0 m	-	0/0 s	A/A	0 m
Southbound Left	-	5 s	A	2 m	-	14 s	B	13 m	-	15 s	B	12 m
Southbound Through/Right	-	0/0 s	A/A	0 m	-	1/0 s	A/A	0 m	-	1/0 s	A/A	0 m
<i>Uplands Ave at Yonge St</i>												
Eastbound Left/Through/Right	0.34	54/23/15 s	D/C/B	16 m	0.65	58/31/30 s	E/C/C	34 m	0.38	54/52/20 s	D/D/B	17 m
Westbound Left	0.05	56 s	E	6 m	0.03	49 s	D	4 m	0.27	59 s	E	14 m
Westbound Through/Right	0.02	0/7 s	A/A	0 m	0.08	53/12 s	D/B	5 m	0.37	49/18 s	D/B	10 m
Northbound Left	0.03	29 s	C	0 m	0.70	51 s	D	8 m	0.09	21 s	C	0 m
Northbound Through	0.31	0 s	A	21 m	0.58	4 s	A	66 m	0.69	7 s	A	117 m
Northbound Right	0.00	0 s	A	0 m	0.00	3 s	A	0 m	0.00	5 s	A	0 m
Southbound Left	0.03	7 s	A	0 m	0.16	16 s	B	0 m	0.29	29 s	C	4 m
Southbound Through/Right	0.66	1/1 s	A/A	10 m	0.84	2/2 s	A/A	27 m	0.63	5/6 s	A/A	72 m
<i>Helen Ave at Yonge St</i>												
Eastbound Left/Through/Right	-	23/0/13 s	C/A/B	0 m	-	65/0/22 s	F/A/C	7 m	-	53/0/16 s	F/A/C	7 m
Westbound Left/Through/Right	-	30/0/6 s	D/A/A	0 m	-	72/0/3 s	F/A/A	4 m	-	69/0/18 s	F/A/C	8 m
Northbound Left	-	16 s	C	2 m	-	26 s	D	6 m	-	15 s	B	5 m
Northbound Through/Right	-	0/0 s	A/A	0 m	-	1/2 s	A/A	2 m	-	3/3 s	A/A	35 m
Southbound Left	-	8 s	A	0 m	-	14 s	B	0 m	-	22 s	C	1 m
Southbound Through/Right	-	0/1 s	A/A	0 m	-	0/1 s	A/A	0 m	-	0/1 s	A/A	0 m
<i>Thornhill Ave at Yonge St</i>												
Eastbound Left/Through/Right	-	35/0/21 s	D/A/C	7 m	-	73/0/21 s	F/A/C	6 m	-	81/21/16 s	F/C/C	7 m
Westbound Left/Through/Right	-	32/0/12 s	D/A/B	12 m	-	81/0/25 s	F/A/C	35 m	-	79/0/21 s	F/A/C	15 m
Northbound Left	-	11 s	B	0 m	-	19 s	C	5 m	-	10 s	A	6 m
Northbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	1 s	A	0 m
Northbound Right	-	1 s	A	0 m	-	2 s	A	0 m	-	1 s	A	0 m
Southbound Left	-	5 s	A	6 m	-	18 s	C	21 m	-	26 s	D	19 m
Southbound Through	-	0 s	A	0 m	-	1 s	A	0 m	-	0 s	A	0 m
Southbound Right	-	0 s	A	0 m	-	1 s	A	0 m	-	0 s	A	0 m
<i>Royal Orchard Blvd at Yonge St</i>												
Eastbound Left/Through/Right	0.01	2/0/0 s	A/A/A	0 m	0.01	0/0/2 s	A/A/A	0 m	0.00	0/0/0 s	A/A/A	0 m
Westbound Left/Through	0.79	54/57 s	D/E	66 m	0.88	52/0 s	D/A	108m	0.77	54/16 s	D/B	55 m
Westbound Right	0.23	9 s	A	0 m	0.29	19 s	B	8 m	0.23	12 s	B	0 m
Northbound Left	0.00	0 s	A	0 m	0.02	28 s	C	0 m	0.00	0 s	A	0 m
Northbound Through	0.31	4 s	A	28 m	0.63	10 s	A	76 m	0.91	9 s	A	104 m
Northbound Right	0.03	2 s	A	0 m	0.09	4 s	A	5 m	0.21	6 s	A	6 m
Southbound Left	0.03	9 s	A	0 m	0.25	26 s	C	3 m	0.51	36 s	D	13 m
Southbound Through/Right	0.77	3/0 s	A/A	39 m	0.92	6/6 s	A/A	99 m	0.69	4/0 s	A/A	54 m

Note: 1. Queue length reflects 95th percentile conditions

**Exhibit 11 Intersection Level-of-Service Impacts with Proposed Langstaff Station**

Intersection/Movement	Level of Service											
	Weekday A.M. Peak Hour 7-8AM				Weekday A.M. Peak Hour 8-9AM				Weekday P.M. Peak Hour			
	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>
<i>High Tech Rd at Yonge St</i>												
Eastbound Left/Through/Right	0.01	0/0/7 s	A/A/A	0 m	0.03	0/0/4 s	A/A/A	0 m	0.05	46/16/6 s	D/B/A	1 m
Westbound Left	0.65	55 s	D	39 m	0.73	52 s	D	52 m	0.72	52 s	D	48 m
Westbound Through/Right	0.10	0/5 s	A/A	6 m	0.33	13/5 s	B/A	7 m	0.51	12/8 s	B/A	14 m
Northbound Left	0.03	19 s	B	0 m	0.18	33 s	C	0 m	0.00	8 s	A	0 m
Northbound Through/Right	0.26	3/3 s	A/A	14 m	0.43	5/4 s	A/A	23 m	0.77	12/15 s	B/B	174 m
Southbound Left	0.32	11 s	B	11 m	0.52	18 s	B	16 m	1.10	27 s	C	29 m
Southbound Through/Right	0.77	6/6 s	A/A	79 m	0.85	10/3 s	A/A	115 m	0.46	6/4 s	A/A	41 m
<i>Garden Ave at Yonge St</i>												
Eastbound Left	0.45	56 s	E	25 m	0.71	70 s	E	61 m	0.36	62 s	E	21 m
Eastbound Through	0.30	57 s	E	19 m	0.52	63 s	E	54 m	0.21	63 s	E	11 m
Eastbound Right	0.76	11 s	B	15 m	1.02	21 s	C	39 m	0.40	7 s	A	6 m
Westbound Left/Through	0.91	54/57 s	D/E	154 m	0.89	54/54 s	D/D	152 m	0.90	51/52 s	D/D	137 m
Westbound Right	0.26	1 s	A	0 m	0.35	2 s	A	0 m	0.52	2 s	A	0 m
Northbound Left	0.42	26 s	C	15 m	0.92	48 s	D	46 m	1.18	48 s	D	60 m
Northbound Through	0.32	24 s	C	45 m	0.52	28 s	C	67 m	0.93	38 s	D	224 m
Northbound Right	0.41	1 s	A	0 m	0.66	3 s	A	0 m	0.69	14 s	B	0 m
Southbound Left	0.61	19 s	B	35 m	0.93	31 s	C	51 m	1.14	53 s	D	50 m
Southbound Through/Right	0.94	24/18 s	C/B	133 m	NA	NA	NA	NA	0.60	19/12 s	B/B	59 m
Southbound Through <sup>2</sup>	NA	NA	NA	NA	0.99	28 s	C	181 m	NA	NA	NA	NA
Southbound Right <sup>2</sup>	NA	NA	NA	NA	0.23	11 s	B	0 m	NA	NA	NA	NA
<i>Hwy 407 E-N/S Ramp at Yonge St</i>												
Westbound Left	0.74	52 s	D	52 m	0.69	52 s	D	45 m	0.31	53 s	D	33 m
Westbound Right	0.29	6 s	A	0 m	0.70	8 s	A	12 m	0.84	20 s	B	33 m
Northbound Through	0.26	6 s	A	26 m	0.44	7 s	A	45 m	0.78	5 s	A	40 m
Southbound Through	0.67	8 s	A	54 m	0.68	7 s	A	44 m	0.51	10 s	A	73 m
<i>Hwy 407 W-N/S Ramp at Yonge St</i>												
Eastbound Left/Through	0.30	47/50 s	D/D	31 m	0.30	48/49 s	D/D	m	0.76	51/51 s	D/D	62 m
Eastbound Right	0.90	25 s	C	57 m	0.96	16 s	B	m	0.99	10 s	A	26 m
Westbound Left	0.46	61 s	E	21 m	0.46	61 s	E	m	0.71	60 s	E	24 m
Westbound Right	0.41	6 s	A	0 m	0.55	9 s	A	m	0.83	16 s	B	17 m
Northbound Through/Right	0.48	10/6 s	A/A	49 m	0.90	12/10 s	B/A	m	1.07	13/8 s	B/A	97 m
Southbound Left	0.43	21 s	C	13 m	0.60	30 s	C	m	0.74	46 s	D	21 m
Southbound Through	0.87	12 s	B	88 m	0.91	11 s	B	m	0.62	12 s	B	70 m
<i>P&amp;R Access at Yonge St</i>												
Eastbound Left	0.47	56 s	E	20 m	0.52	56 s	E	21 m	0.93	47 s	D	85 m
Eastbound Right	0.14	12 s	B	0 m	0.15	14 s	B	0 m	0.31	11 s	B	12 m
Westbound Left/Right	0.02	53/7 s	D/A	0 m	0.02	11/2 s	B/A	0 m	0.02	46/4 s	D/A	5 m
Northbound Left	0.77	42 s	D	45 m	0.48	43 s	D	15 m	0.72	40 s	D	8 m
Northbound Through/Right	0.38	3/0 s	A/A	30 m	0.64	2/2 s	A/A	28 m	0.94	7/4 s	A/A	156 m
Southbound Left	0.01	10 s	A	0 m	0.01	24 s	C	0 m	0.19	35 s	C	0 m
Southbound Through	0.83	4 s	A	36 m	0.96	2 s	A	25 m	0.91	5 s	A	64 m
Southbound Right	0.83	2 s	A	11 m	0.35	3 s	A	2 m	0.22	4 s	A	3 m
<i>Longbridge Rd at Yonge St</i>												
Eastbound Left/Right	-	71/26 s	F/D	12 m	-	69/22 s	F/C	13 m	-	80/21 s	F/C	11 m
Northbound Left	-	20 s	C	17 m	-	32 s	D	5 m	-	31 s	D	5 m
Northbound Through	-	3 s	A	0 m	-	2 s	A	0 m	-	11 s	B	0 m
Southbound Through	-	4 s	A	0 m	-	3 s	A	0 m	-	5 s	A	0 m
Southbound Right	-	4 s	A	0 m	-	4 s	A	0 m	-	7 s	A	0 m

Note: 1. Queue length reflects 95th percentile conditions

2. The 8:00 to 9:00 a.m. capacity and level-of-service analysis confirms the need for a separate southbound right turn lane

**Exhibit 11 (Cont'd) Intersection Level-of-Service Impacts with Proposed Langstaff Station**

Intersection/Movement	Level of Service											
	Weekday A.M. Peak Hour 7-8AM				Weekday A.M. Peak Hour 8-9AM				Weekday P.M. Peak Hour			
	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>	V/C	Delay	LOS	Queue <sup>1</sup>
<i>Bunker Rd at Yonge St</i>												
Eastbound Left/Right	-	22/0 s	C/A	0 m	-	35/18 s	D/C	6 m	-	32/3 s	D/A	0 m
Northbound Left	-	2 s	A	0 m	-	27 s	D	3 m	-	22 s	C	5 m
Northbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	1 s	A	0 m
Southbound Through	-	1 s	A	0 m	-	1 s	A	0 m	-	0 s	A	0 m
Southbound Right	-	1 s	A	0 m	-	1 s	A	0 m	-	2 s	A	0 m
<i>Kirk Dr at Yonge St</i>												
Eastbound Left/Through/Right	-	0/0/0 s	A/A/A	0 m	-	0/0/0 s	A/A/A	0 m	-	0/0/0 s	A/A/A	0 m
Westbound Left/Through/Right	-	22/0/12 s	C/A/B	7 m	-	27/0/18 s	D/A/C	9 m	-	29/0/19 s	D/A/C	7 m
Northbound Left	-	0 s	A	0 m	-	0 s	A	0 m	-	0 s	A	0 m
Northbound Through/Right	-	0/0 s	A/A	0 m	-	0/0 s	A/A	0 m	-	0/0 s	A/A	0 m
Southbound Left	-	7 s	A	3 m	-	14 s	B	10 m	-	12 s	B	11 m
Southbound Through/Right	-	1/0 s	A/A	0 m	-	1/0 s	A/A	0 m	-	1/0 s	A/A	0 m
<i>Uplands Ave at Yonge St</i>												
Eastbound Left/Through/Right	0.34	54/23/14 s	D/C/B	16 m	0.65	57/40/26 s	E/D/C	32 m	0.38	54/52/19 s	D/D/B	17 m
Westbound Left	0.05	56 s	E	6 m	0.03	57 s	E	4 m	0.27	59 s	E	15 m
Westbound Through/Right	0.02	0/7 s	A/A	0 m	0.08	58/15 s	E/B	6 m	0.37	49/19 s	D/B	10 m
Northbound Left	0.03	18 s	B	0 m	0.68	47 s	D	7 m	0.11	23 s	C	0 m
Northbound Through	0.37	1 s	A	25 m	0.61	4 s	A	69 m	0.68	7 s	A	117 m
Northbound Right	0.00	0 s	A	0 m	0.00	5 s	A	0 m	0.00	3 s	A	0 m
Southbound Left	0.03	9 s	A	0 m	0.18	14 s	B	0 m	0.28	28 s	C	3 m
Southbound Through/Right	0.62	0/0 s	A/A	4 m	0.83	1/1 s	A/A	18 m	0.67	6/4 s	A/A	83 m
<i>Helen Ave at Yonge St</i>												
Eastbound Left/Through/Right	-	21/0/5 s	C/A/A	0 m	-	67/0/18 s	F/A/C	7 m	-	56/0/13 s	F/A/B	7 m
Westbound Left/Through/Right	-	31/0/7 s	D/A/A	0 m	-	79/0/3 s	F/A/A	0 m	-	90/0/24 s	F/A/C	8 m
Northbound Left	-	19 s	C	1 m	-	23 s	C	6 m	-	15 s	B	5 m
Northbound Through/Right	-	0/0 s	A/A	0 m	-	0/1 s	A/A	0 m	-	3/2 s	A/A	37 m
Southbound Left	-	10 s	A	0 m	-	19 s	C	1 m	-	41 s	E	3 m
Southbound Through/Right	-	0/0 s	A/A	0 m	-	0/0 s	A/A	0 m	-	0/0 s	A/A	0 m
<i>Thornhill Ave at Yonge St</i>												
Eastbound Left/Through/Right	-	34/0/19 s	D/A/C	7 m	-	65/0/24 s	F/A/C	7 m	-	75/39/18 s	F/E/C	7 m
Westbound Left/Through/Right	-	36/0/13 s	E/A/B	13 m	-	95/0/29 s	F/A/D	45 m	-	82/0/21 s	F/A/C	15 m
Northbound Left	-	8 s	A	0 m	-	15 s	B	4 m	-	12 s	B	6 m
Northbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	1 s	A	0 m
Northbound Right	-	1 s	A	0 m	-	1 s	A	0 m	-	1 s	A	0 m
Southbound Left	-	7 s	A	6 m	-	17 s	C	19 m	-	29 s	D	25 m
Southbound Through	-	0 s	A	0 m	-	0 s	A	0 m	-	0 s	A	0 m
Southbound Right	-	0 s	A	0 m	-	1 s	A	0 m	-	0 s	A	0 m
<i>Royal Orchard Blvd at Yonge St</i>												
Eastbound Left/Through/Right	0.01	0/0/0 s	A/A/A	0 m	0.01	0/0/1 s	A/A/A	0 m	0.00	0/0/0 s	A/A/A	0 m
Westbound Left/Through	0.76	53/53 s	D/D	62 m	0.87	51/0 s	D/A	103 m	0.77	56/12 s	E/B	55 m
Westbound Right	0.32	10 s	A	2 m	0.33	19 s	B	11 m	0.25	13 s	B	0 m
Northbound Left	0.00	0 s	A	0 m	0.02	23 s	C	0 m	0.00	0 s	A	0 m
Northbound Through	0.36	5 s	A	32 m	0.65	10 s	A	75 m	0.90	9 s	A	103 m
Northbound Right	0.03	2 s	A	0 m	0.09	4 s	A	6 m	0.20	5 s	A	6 m
Southbound Left	0.05	9 s	A	0 m	0.31	25 s	C	1 m	0.65	36 s	D	18 m
Southbound Through/Right	0.71	1/1 s	A/A	15 m	0.90	5/4 s	A/A	86 m	0.74	4/0 s	A/A	46 m

Note: 1. Queue length reflects 95th percentile conditions

The capacity and level-of-service analyses confirm that impacts during the afternoon peak hour as well as during the morning peak hours of the proposed facility and the adjacent street traffic can be accommodated along Yonge Street. The majority of the impacts occur between Highway 7 (Garden Avenue) and Longbridge Road. Individual movements with volume-to-capacity ratios exceeding 0.85 or levels-of-service 'E' or worse are highlighted in the summary tables. A description of the impacts is provided below.

The southbound and the westbound approaches at the Yonge Street intersection with the Highway 7 access (opposite Garden Avenue) can be expected to approach capacity during the morning peak hours. Notwithstanding that corresponding queue lengths on these approaches extend to between 140 and 180 metres, the level-of-service impacts are manageable. During the afternoon peak hour, the northbound and westbound approaches to this intersection will also approach capacity. Although northbound queues will increase from 180 to 225 metres, the distance to the Highway 407 westbound off-ramp is 300 metres. Westbound queues approaching Yonge Street from Highway 7 will increase from 115 to 140 metres. The northbound and southbound left-turn movements are currently capacity constrained during the afternoon peak hour (volume-to-capacity ratios of 1.09 and 1.14, respectively). Although the volume-to-capacity ratio for the northbound left-turn movement increases to 1.18, the simulation identifies an adequate level of service and queue length of 60 metres.

The eastbound right-turn and southbound through movements at the Highway 407 south ramp terminal intersection will approach capacity throughout the morning peak period between 7:00 and 9:00 a.m. while the eastbound right-turn and northbound through movements become capacity constrained during the afternoon peak hour. Notwithstanding this, the detailed micro-simulation analysis confirms adequate operational performance during the peak hours.

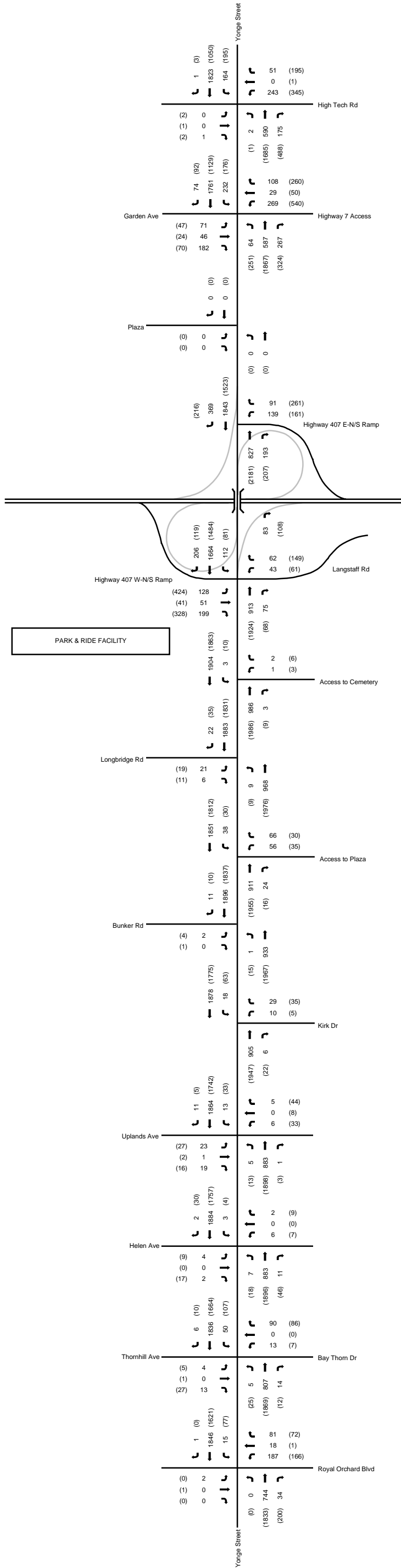
The southbound approach to the proposed signalized intersection serving the Langstaff parking facility will approach capacity during the morning peak hour of the adjacent street traffic. However, the corresponding queue length of less than 30 metres demonstrates the benefits of regulating or metering flow with appropriate traffic signal offsets. This proposed intersection approaches capacity during the afternoon peak hour when northbound queues can be expected to extend approximately 160 metres. The corresponding impacts on Longbridge Road egress are inevitable given the proposed intersection spacing. There will likely be a corresponding diversion of traffic from Longbridge Road to adjacent collector road intersections.

Although not accounted for as part of the traffic analysis, it is reasonable to expect a mode shift from existing auto-driver/auto-passenger trips to transit use. In fact, the planned commuter parking facility plays a role in achieving this shift.

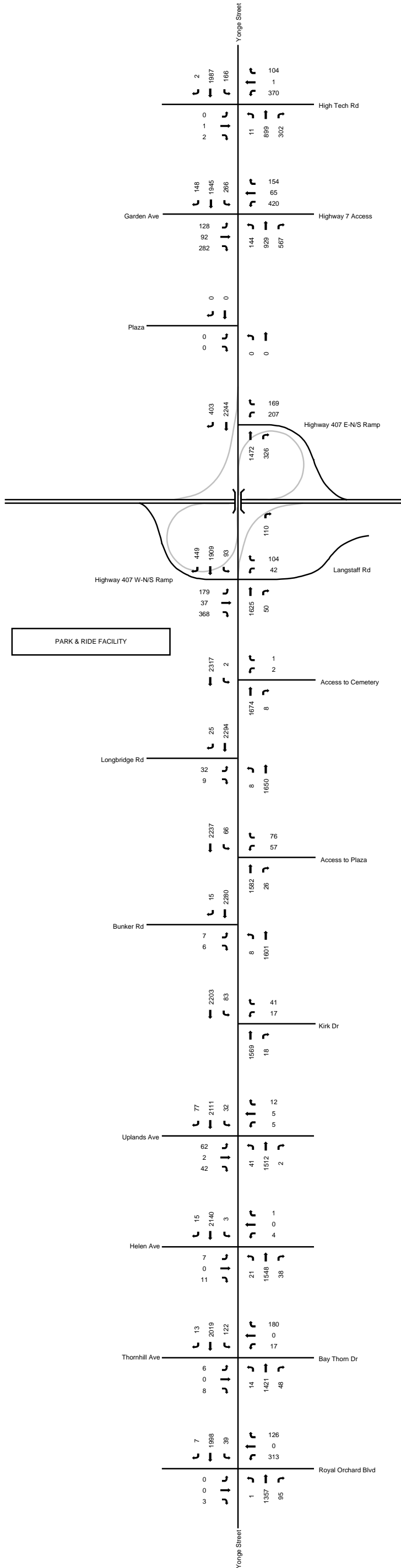
### **Impact of Planned Development Intensification**

Proposed development within Langstaff Gateway and Richmond Hill Centre will introduce additional challenges to traffic management in the corridor. The provision of higher order transit and supporting infrastructure (including the commuter parking and passenger pick-up and drop-off facilities) is a fundamental part of the solution to managing demand within the study area and points south. Notwithstanding, there is a need to further assess traffic operations to establish how best to integrate the development and transit requirements in the study area and establish appropriate mitigation measures in this regard.

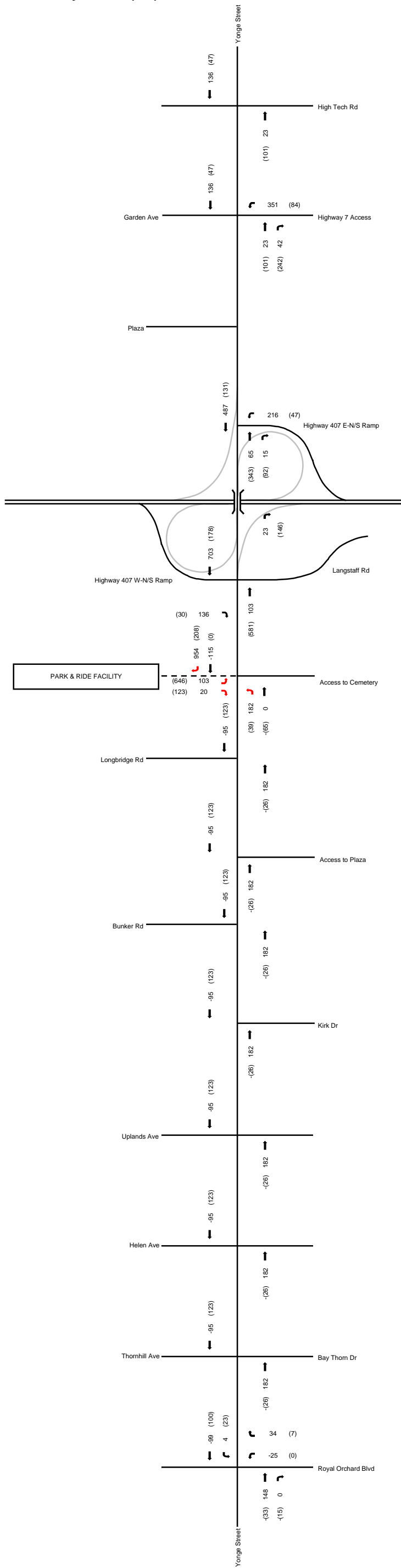
**Exhibit 4**  
**Existing Traffic Volumes**  
**Weekday 7-8 AM (PM) Peak Hours**



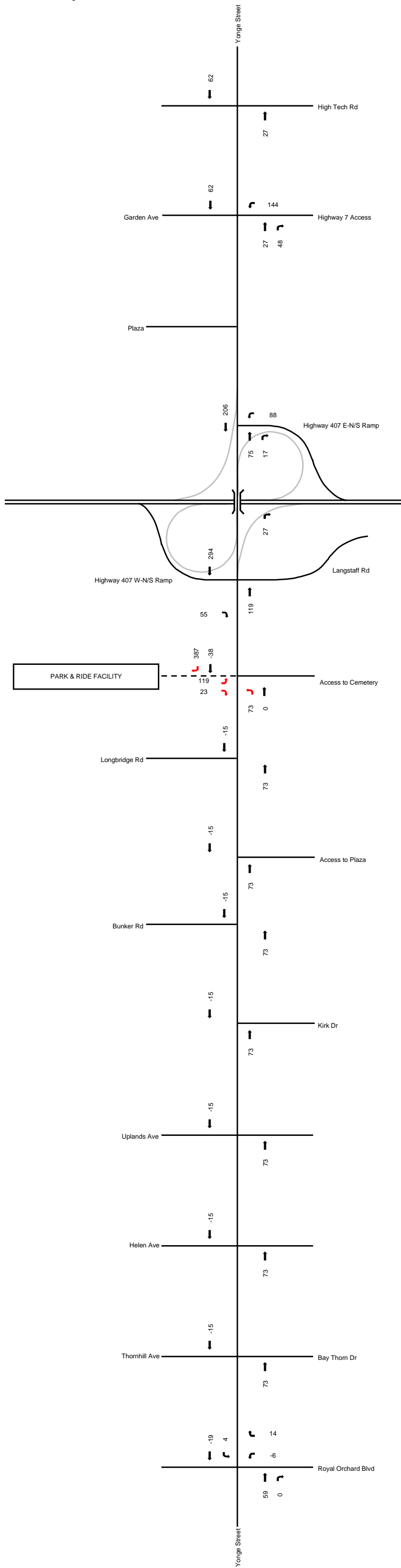
**Exhibit 5  
Existing Traffic Volumes  
Weekday 8-9 AM Peak Hour**



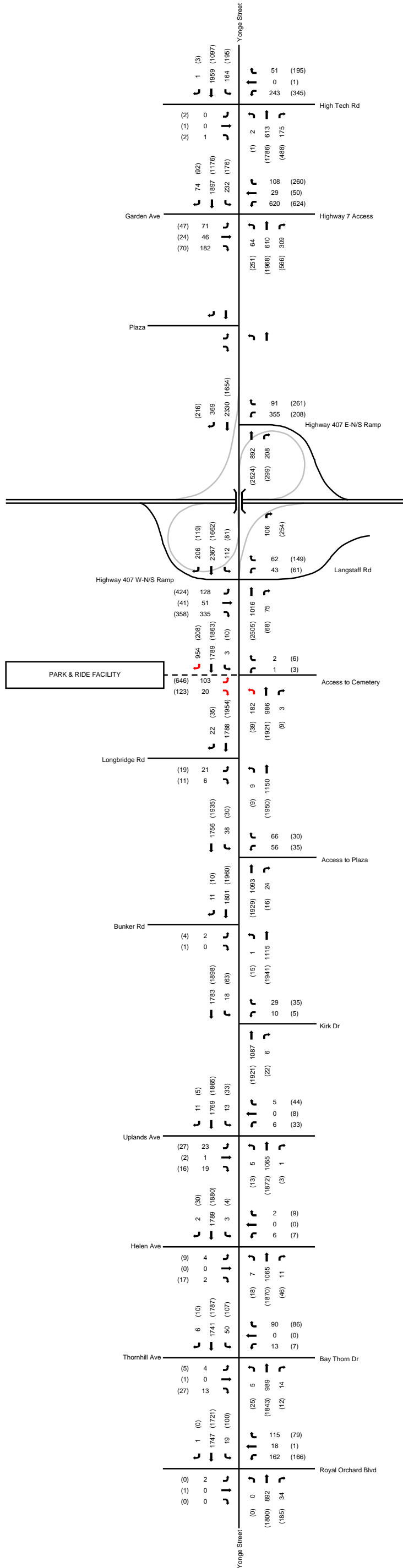
**Exhibit 6**  
**Langstaff Station Traffic Volumes**  
**Weekday 7-8 AM (PM) Peak Hours**



**Exhibit 7  
Langstaff Station Traffic Volumes  
Weekday 8-9 AM Peak Hour**



**Exhibit 8**  
**Total Traffic Volumes**  
**Weekday 7-8 AM (PM) Peak Hours**



**Exhibit 9**  
**Total Traffic Volumes**  
**Weekday 8-9 AM Peak Hour**

