APPENDIX L

DETAILED EVALUATION OF ALTERNATIVE ALIGNMENTS AND CONCEPTUAL STATIONS

Spadina Subway Extension
Environmental Assessment
Downsview Station to Steeles Avenue

Appendix L

Alternative Methods of Carrying out the Undertaking

February 2006

Spadina Subway Extension

Environmental Assessment

Downsview Station to Steeles Avenue

Appendix L

Alignments and Station Concepts

prepared by

Grant N. Kauffman, M.E.S
Vice President, Environmental Planning

Renée A. Afoom, M.E.S
Environmental Planner

LGL Limited
environmental research associates
22 Fisher Street, P.O. Box 280
King City, Ontario L7B 1A6
Email: kingcity@lgl.com
URL: www.lgl.com

February 2006

Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

Section 6.1(2) of the *Environmental Assessment Act* requires an environmental assessment to include an evaluation of alternative methods of carrying out an undertaking. For the Spadina Subway Extension, alternative methods include subway alignments and subway station concepts. This appendix provides a step by step description of the approach used to evaluate and select the preferred subway alignment and station concepts. A detailed description of the data collection and analysis process for each evaluation indicator is provided.

2.0 Multi Attribute Trade - Off System (MATS)

This section describes the numeric evaluation method used by the study team to evaluate the alternative subway alignments and station concepts.

The numeric method used to evaluate alternatives is the Multi-Attribute Tradeoff System (MATS) – Personal Computer Version (2.02). MATS-PC is a computer program designed by the U.S. Department of the Interior, Bureau of Reclamation to help planners evaluate multi-attribute alternatives to reach a judgment of each alternative's relative worth or desirability. MATS-PC leads the user through a series of questions (a tradeoff analysis) which focuses on the relative importance of various characteristics of the alternatives.

The MATS program documents the judgments which lead to the development of a policy for evaluating alternatives. The program then applies this evaluation policy to up to forty alternatives. MATS-PC can be used to improve the planning process by structuring and documenting the judgments that must be made when evaluating plans. It is designed to be used both by technical planners and as a framework for public input into the planning process. MATS-PC can also be used to run sensitivity tests to determine how different weights and assumptions influence the results of the analysis.

The major components of MATS include: factors; function forms; weights; plans; impacts; and overall scores. These components are described below.

Factors

Factors are the key aspects of the analysis on which the final selection will be made. Each factor represents a feature that is influential to the decision. Factors are expected to have measurable coordinates and may be a range of potential impacts, on a numerical scale, and a yes/no variable.

Function Forms

Function forms are curves describing the thresholds of desirability and undesirability of a factor. Function forms are important elements of the process as they allow the decision-maker to translate facts about a factor into measures of worth.

Weights

Weights refer to the value/importance placed on a factor/indicator. Every factor must be assigned a specific weight that will represent the value or relative importance placed on that factor. As weights are discretionary, the weight placed on each factor must express the relative value/importance of the factor/indicator as perceived by the decision-maker. Assigning a relative value to a factor/indicator will ensure that the overall performance of a given alternative will not only depend on how the alternative is rated in relation to the factor/indicator, but also on the weight place on that particular factor/indicator. All weights are standardized to sum up to 1.0.

Plans

A plan is the term used to describe the options/alternatives/choices among which a selection must be made. As in the case of factors/indicators, the MATS process can evaluate up to 40 plans per analysis. All plans must be assigned a plan-name and description.

Impacts

Impacts refer to the raw facts about each alternative. This is often the raw data pertaining to each alternative or simply the way a plan performs on a factor. Impacts are simply the field data collected by the study team about each alternative subway alignment and station concepts. Impacts are the determining and basic facts about each alternative; thus, to ensure consistency, it is important to select a specific mode of measurement for all impacts, preferably numerical values.

Overall scores

The overall scores refer to the sum total of the weighted – subjective scores obtained for each factor. It is important to note that overall scores of an alternative can be interpreted in two terms; they can be interpreted in terms of the absolute worth of an alternative and as the magnitude or significance of difference between two or more alternatives.

The MATS Evaluation Process

Figure 1 presents the mathematical formula used in the MATS process to produce the overall score for each alternative.

Figure 1. The MATS Evaluation Process

$$\text{Plan Score (k)} = \sum_{i=1}^{nfac} (\text{wgt (i)} * \text{util (i.k)})$$

Where:

k = plan

nfac = number of factors in project

wgt (i) = standardized weight of factor i

$$\text{wgt (i)} = \frac{\text{wgt (i)}}{\sum_{j=1}^{nfac} \text{wgt (j)}}$$

hence: $\sum_{i=1}^{nfac} \text{wgt (i)} = 1.g$

util (i, k) = the value of the utility function of factor 1, at impact k.

2.1 Factors

For this phase of the EA, the study team developed a total of 77 MATS factors out of the 38 project indicators and 5 objectives. Table (1) presents the MATS indicators, factors and corresponding factor names developed for all 77 factors.

Table 1 - MATS Factors

Indicator	Factor Name	MATS Factors	#
A 1.1. Existing population & employment within 500m walking distance of subway stations.	A 1.1 Number of people and employees within 500m radius of main entrance (pop per ha)	A 1.1	1
A 1.2. Future population & employment within 500m walking distance of subway stations.	A 1.2 Number of people and employees within 500m radius of main entrance (pop per ha)	A 1.2	2
A 1.3. Students, faculty & staff within 500m walking distance of the York University station.	A 1.3 Number of people and employees within 500m radius of main entrance	A 1.3	3
A 2.1. Travel time from Downsview Station to Steeles West Station.	A 2.1A Total length of alignments (m)	A 2.1A	4
	A 2.1B Estimated run times	A 2.1B	5
A 2.2. Speed & comfort for subway passengers.	A 2.2 A Length of curves with radii less than 457m (radius & length)	A 2.2A	6
	A 2.2B Length of curves with radii between 457m and 750m (radius & length)	A 2.2B	7
B 1.1 Transfer time from bus to subway platform at Steeles West Station & Finch West Station.	B 1.1 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre to subway platform.	B 1.1	8
B 1.2 Transfer time from GO Rail to subway platform at Sheppard West Station.	B 1.2 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform	B 1.2	9
B 1.3 Delay time for through passengers on the 36 – Finch West Bus.	B 1.3A Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [36 Finch]	B 1.3A	10
	B 1.3B Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [41 Keele]	B 1.3B	11
B 1.4 Transfer time from subway to future LRT in hydro corridor at Finch West Station.	B 1.4 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (min)	B 1.4	12
	B 1.4 Potential to provide a connection from subway platform to LRT in Hydro Corridor/new LRT terminal – *specific to Finch West Station*.		
B 2.1 Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	B 2.1 Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.	B 2.1	13
B 2.2 Transfer time from other travel modes to subway platform.	B 2.2A Walking time based on 1.2 m/s from PPUDO/taxi stands to closest station entrance(s).	B 2.2A	14
	B 2.2B Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance(s).	B 2.2B	15
B 2.3 Quality of walking environment from other travel modes to subway platform.	B 2.3A Weather protected (yes/no) connection from Sheppard to entrance building	B 2.3A	16
	B 2.3B Entrance type (Staffed/automated)	B 2.3B	17
	B 2.3C Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time (min).	B 2.3C	18
B 3.1 Number, type and sensitivity of significant environmental features potentially affected by a future subway	B 3.1A Number of natural heritage features.	B3.1A	19
	B 3.1B Area of groundwater discharge. (ha) (100m zone of influence).	B 3.1B	20

Indicator	Factor Name	MATS Factors	#
extension into York Region.	B 3.1C Number of residences, businesses and community/recreational/ institutional facilities.	B 3.1C	21
	B 3.1D Number of cultural heritage features (100m zone of influence).	B 3.1D	22
	B 3.1E Compatibility with planned land-use	B 3.1E	23
	B 3.1E Ability to modify station to reflect changing bus demands – *specific to Steeles West Station*		
B 3.2 Number and type of curves between Steeles West Station and Highway 407.	B 3.2A Total length of alignment (m).	B 3.2A	24
	B 3.2B Length of curves with radii less than 457 m.	B 3.2B	25
	B 3.2C Length of curves with radii between 750 m and 457 m.	B 3.2C	26
C 1.1 Ability to combine stations with the existing and future built form.	C 1.1A Amount of area identified as redevelopment within zone of influence (ha).	C 1.1A	27
	C 1.1B Amount of redevelopable frontage within zone of influence (ha).	C 1.1B	28
	C 1.1C Amount of redevelopable frontage encumbered by station amenities –length of right-of-way (m).	C 1.1C	29
C 2.1 Potential to create a safe environment for pedestrians, cyclists and transit passengers.	C 2.1A Number of direct connections between subway facilities, parking lots and bus facilities for pedestrians and cyclists.	C 2.1A	30
	C 2.1B Active surveillance (low, medium, high)	C 2.1B	31
D 1.1 Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and population/species located within alignment and station footprint areas.	D 1.1A Area of natural heritage features (hectares)	D 1.1A	32
	D 1.1B Type of natural heritage features (ELC classification)	D 1.1B	33
	D 1.1C Significance of natural heritage features (local, regional, provincial, federal)	D 1.1C	34
	D 1.1D Resiliency of natural heritage features (low, medium, high)	D 1.1D	35
D 1.2 Area, type, significant and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.	D 1.2A Area of natural heritage features (hectares).	D 1.2A	36
	D 1.2B Type of natural heritage features (ELC classification).	D 1.2B	37
	D 1.2C Significance of natural heritage features (local, regional, provincial, federal).	D 1.2C	38
	D 1.2D Resiliency of natural heritage features (low, medium, high).	D 1.2D	39
D 2.1 Magnitudes and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	D 2.1A Area of groundwater recharge/discharge affected.	D 2.1A	40
	D 2.1B Significance of groundwater recharge/discharge areas affected.	D 2.1B	41
	D 2.1C Area of aquifers affected.	D 2.1C	42
	D 2.1D Significance of aquifers affected.	D 2.1D	43
D 2.2 Potential for soil erosion.	D 2.2A Area of soil to be disturbed.	D 2.2A	44
	D 2.2B Type of soil to be disturbed.	D 2.2B	45
D 3.1 Area of flood storage capacity removed.	D 3.1 Area of flood storage capacity removed (hectares).	D 3.1	46
D 3.2 Length/area of watercourses/waterbodies altered.	D 3.2 Length/area of surface water features (meters/hectares).	D 3.2	47
D 3.3 Ease and effectiveness of stormwater management at subway facilities.	D 3.3 Opportunities consistent with City of Toronto WWFMMP	D 3.3	48
D 4.1 Number, type and sensitivity of	D 4.1A Number of business/employment directly affected	D 4.1A	49

Indicator	Factor Name	MATS Factors	#
residences, businesses and community/recreational/institutional facilities located within alignment and station footprint areas.	D 4.1A Number of sensitive buildings over or adjacent to the alignment. – *specific to North Alignments*		
	D 4.1B Number of community/recreational facilities impacted.	D 4.1B	50
	D 4.1C Number of institutional facilities impacted.	D 4.1C	51
D 4.2 Area, type and sensitivity of residences, businesses and community/recreational/institutional facilities located adjacent zones of influence. (150m)	D 4.2A Amount of area of stable employment within zone of influence (ha). – *specific to South & North Alignments*	D 4.2A	52
	D 4.2A Amount of area of stable residential within zone of influence – *specific to Finch West Station*		
	D 4.2A Ability to minimize impact on existing stable residential lands within zone of influence (high < 25ha, Medium< 40ha, Low > 40m – *specific to Steeles West Station*		
	D 4.2B Amount of area identified as stable residential within zone of influence (ha) – *specific to South Alignments*	D 4.2B	53
	D 4.2B Area of stable development on the York University Campus within zone of influence (ha). – *specific to North Alignment*		
	D 4.2B Area of stable employment within zone of influence (ha). – *specific to Finch West Station*		
	D 4.2B Ability to minimize impact on existing stable employment lands within zone of influence (high < 25ha, Medium< 40ha, Low > 40m – *specific to Steeles West Stations*		
D 5.1 Number of permanent road closures or access modifications.	D 5.1A Number of closures.	D 5.1A	54
	D 5.1B Number of driveways with reduced access (e.g. full access reduced to right-in/right-out).	D 5.1B	55
D 5.2 Traffic impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	D 5.2A Number of critical movements within vicinity of station.	D 5.2A	56
	D 5.2B Sum of intersection delays (in sec's) at key intersections within study area.	D 5.2B	57
	D 5.2C Number of entrances/egresses obstructed by average peak hour queue lengths.	D 5.2C	58
D 5.3 Impacts on safety of transportation system.	D 5.3A Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	D 5.3A	59
	D 5.3B Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	D 5.3B	60
D 5.4 Accessibility for emergency services including fire, police and ambulance.	D 5.4 Impact on response times for EMS services.	D 5.4	61
D 6.1 Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway.	D 6.1 Angle of crossing at CN line (degrees)	D 6.1	62
D 7.1 Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	D 7.1A Number of archaeological sites.	D 7.1A	63
	D 7.1B Unlikeliness of the discovery of archeological remains.	D 7.1B	64
	D7.1C Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act	D 7.1C	65
	D7.1D Number of heritage properties identified during a field review.	D 7.1D	66
D 7.2 Number, type, significance and sensitivity of archeological sites, built	D 7.2A Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	D 7.2A	67

Indicator	Factor Name	MATS Factors	#
heritage features and cultural landscapes located within adjacent zones of influence (100m).	D 7.2B Number of heritage properties identified during a field review.	D 7.2B	68
D 8.1 Number, type and length of pipelines requiring relocation due to subway extension.	D 8.1A Number of pipeline crossing.	D 8.1A	69
	D 8.1B Vertical separation (in meters) between pipelines and subway tunnel.	D 8.1B	70
E 1.1 Capital costs including underground and surface subway facilities, fleet and storage.	E 1.1 Capital costs estimated in 2005 dollars after GST Rebate $(millions).	E 1.1	71
E 2.1 Total property cost	E 2.1 Estimated real estate costs in 2005 dollars.	E 2.1	72
E 2.2 Potential environmental cleanup costs.	E 2.2 Number of known or potential contaminated sites within zone of influence of subway extension.	E 2.2	73
E3.1 The dollar value of net fare and other revenues including commuter parking.	E 3.1 Total annual ridership on subway extension measured in number of riders.	E 3.1	74
E 3.2 Operations and maintenance cost of the subway extension, including feeder bus operations.	E 3.2A Total length of track on curve (all radii).	E 3.2A	75
	E 3.2B Reduction (addition) to total route length for existing bus services in the study area.	E 3.2B	76
	E 3.2C Contains project elements with higher operating & maintenance needs.	E 3.2C	77

Certain factors/indicators were further customized to specific alignments and stations. This resulted in the development of several versions of a factor/indicator as seen in B1.4; B3.1E; D4.1A; and, D4.2A and B. This ensured that key features that were solely applicable to particular alignments and stations concepts were captured during the MATS and RAM evaluations.

2.2 *Function Forms*

A prerequisite of the MATS process was the identification of the threshold of desirability and undesirability of each of the 77 indicators/factors. Thus, the study team defined the function forms for each factor to help measure the level of relative worth of each factor. The act of assigning threshold of desirability of a factor is comparable to assigning weights to factors; in that, the threshold of desirability of a factor is based on the value or worth of that factor to the decision.

Prior to identifying the function forms, the study team had to determine the numerical scales for each indicator. As most of the indicators were quantitative, the low end scale was set at 0 (zero) and the high end scale was set at the highest level of impact recorded for each indicator. The use of this ratio scale helped to maintain the integrity of the data and not create artificial separation between values that are similar. (**HV** represents the High-end Values)

In addition, all subjective data was converted into numerical coordinates and placed on an ordinal scale with 1 representing the low end of the scale and 3 representing the high end of the scale as illustrated in Table (2).

Table 2 – Numerical Conversions

Subjective Scales	Numerical Scales
High	3
Medium	2
Low	1

For some factors, a higher value was recognized as the best threshold of desirability while for other factors a lower value represented the best threshold of desirability, as illustrated in Table (3).

Desirable Threshold **BT** = Best Threshold of Desirability
WT = Worst Threshold of Desirability

For example, for the first factor/indicator in Table 3 (Number of people and employees within 500 m radius of the main entrance (pop per ha)), the low end of the scale was 0 which corresponds with the **WT** (worst threshold of desirability). On the other hand, the high end of the scale for this factor/indicator was the highest level of impact recorded for this factor/indicator which corresponds with the **BT** (best threshold of desirability). Implying that, MATS will interpret higher impacts for this factor/indicator as better values. Simply put, the higher the number of people and employees within 500m radius of the main entrance the better. Table 3 describes the function forms for the subway alignments and station concepts.

Table 3 - MATS Factors and Corresponding Function Forms

#	Factor Name	Function Form	
		BT	WT
1	A 1.1 Number of people and employees within 500m radius of main entrance (pop per ha)	**HV**	**0**
2	A 1.2 Number of people employees within 500m radius of main entrance (pop per ha)	**HV**	**0**
3	A 1.3 Number of people and employees within 500m radius of main entrance (York University data)	**HV**	**0**
4	A 2.1A Total length of alignments (m)	**0**	**HV**
5	A 2.1B Estimated run times	**0**	**HV**
6	A 2.2 A Length of curves with radii less than 457m (radius & length)	**0**	**HV**
7	A 2.2B Length of curves with radii between 457m and 750m (radius & length)	**0**	**HV**
8	B 1.1 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre to subway platform.	**0**	**HV**
9	B 1.2 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform	**0**	**HV**
10	B 1.3A Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [36 Finch]	**0**	**HV**
11	B 1.3B Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [41 Keele]	**0**	**HV**
12	B 1.4 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (min)	**HV**	**0**
	B 1.4 Potential to provide a connection from subway platform to LRT in Hydro Corridor/new LRT terminal – specific *to Finch West Station*.		
13	B 2.1 Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.	**0**	**HV**
14	B 2.2A Walking time based on 1.2 m/s from PPUDO/taxi stands to closest station entrance(s).	**0**	**HV**
15	B 2.2B Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance(s).	**0**	**HV**
16	B 2.3A Weather protected (yes/no) connection from Sheppard Avenue to entrance building	**HV**	**0**
17	B 2.3B Entrance type (staffed/automated)	**HV**	**0**

#	Factor Name	Function Form	
		BT	WT
18	B 2.3C Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time (min).	**0**	**HV**
19	B 3.1A Number of natural heritage features.	**0**	**HV**
20	B 3.1B Area of groundwater discharge. (ha) (100m zone of influence).	**0**	**HV**
21	B 3.1C Number of residences, businesses and community/recreational/ institutional facilities.	**0**	**HV**
22	B 3.1D Number of cultural heritage features (100m zone of influence).	**0**	**HV**
23	B 3.1E Compatibility with planned land-	**HV**	**0**
	B 3.1E Ability to modify station to reflect changing bus demands – *specific to Steeles West Station*		
24	B 3.2A Total length of alignment (m).	**0**	**HV**
25	B 3.2B Length of curves with radii less than 457 m.	**0**	**HV**
26	B 3.2C Length of curves with radii between 750 m and 457 m.	**0**	**HV**
27	C 1.1A Amount of area identified as redevelopment within zone of influence (ha).	**HV**	**0**
28	C 1.1B Amount of redevelopable frontage within zone of influence (ha).	**HV**	**0**
29	C 1.1C Amount of redevelopable frontage encumbered by station amenities –length of right-of-way (m).	**0**	**HV**
30	C 2.1A Number of direct connections between subway facilities, parking lots and bus facilities for pedestrians and cyclists.	**0**	**HV**
31	C 2.1B Active surveillance (low, medium, high)	**HV**	**0**
32	D 1.1A Area of natural heritage features (hectares)	**0**	**HV**
33	D 1.1B Type of natural heritage features (ELC classification)	**0**	**HV**
34	D 1.1C Significance of natural heritage features (local, regional, provincial, federal)	**0**	**HV**
35	D 1.1D Resiliency of natural heritage features (low, medium, high)	**HV**	**0**
36	D 1.2A Area of natural heritage features (hectares).	**0**	**HV**
37	D 1.2B Type of natural heritage features (ELC classification).	**0**	**HV**
38	D 1.2C Significance of natural heritage features (local, regional, provincial, federal).	**0**	**HV**
39	D 1.2D Resiliency of natural heritage features (low, medium, high).	**HV**	**0**
40	D 2.1A Area of groundwater recharge/discharge affected.	**0**	**HV**
41	D 2.1B Significance of groundwater recharge/discharge areas affected. (all local)	**0**	**HV**
42	D 2.1C Area of aquifers affected (temporary, low to moderate).	**0**	**HV**
43	D 2.1D Significance of aquifers affected (all local)	**0**	**HV**
44	D 2.2A Area of soil to be disturbed.	**0**	**HV**
45	D 2.2B Type of soil to be disturbed.	**0**	**HV**
46	D 3.1 Area of flood storage capacity removed (hectares).	**0**	**HV**
47	D 3.2 Length/area of surface water features (meters/hectares).	**0**	**HV**
48	D 3.3 Opportunities consistent with City of Toronto WWFMMP	**HV**	**0**
49	D 4.1A Number of individual properties directly affected.	**0**	**HV**
	D 4.1A Number of sensitive buildings over or adjacent to the alignment. – *specific to North Alignments*		
50	D 4.1B Number of community/recreational facilities impacted.	**0**	**HV**
51	D 4.1C Number of institutional facilities impacted.	**0**	**HV**
52	D 4.2A Amount of area of stable employment within zone of influence (ha). – *specific to South & North Alignments*	**0**	**HV**

#	Factor Name	Function Form	
		BT	WT
	D 4.2A Amount of area of stable residential within zone of influence – *specific to Finch West Station*	**0**	**HV**
	D 4.2A Ability to minimize impact on existing stable residential lands within zone of influence (high < 25ha, Medium< 40ha, Low > 40m – *specific to Steeles West Station*	**HV**	**0**
53	D 4.2B Amount of area identified as stable residential within zone of influence (ha) – *specific to South Alignments*	**0**	**HV**
	D 4.2B Area of stable development on the York University Campus within zone of influence (ha). – *specific to North Alignment*		
	D 4.2B Area of stable employment within zone of influence (ha). – *specific to Finch West Station*		
	D 4.2B Ability to minimize impact on existing stable employment lands within zone of influence (high < 25ha, Medium< 40ha, Low > 40m – *specific to Steeles West Stations*	**HV**	**0**
54	D 5.1A Number of Closures.	**0**	**HV**
55	D 5.1B Number of driveways with reduced access (e.g. full access reduced to right-in/right-out).	**0**	**HV**
56	D 5.2A Number of critical movements within vicinity of station.	**0**	**HV**
57	D 5.2B Sum of intersection delays (in sec's) at key intersections within study area.	**0**	**HV**
58	D 5.2C Number of entrances/egresses obstructed by average peak hour queue lengths.	**0**	**HV**
59	D 5.3A Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	**0**	**HV**
60	D 5.3B Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	**0**	**HV**
61	D 5.4 Impact on response times for EMS services.	**0**	**HV**
62	D 6.1 Angle of crossing at CN line (degrees)	**0**	**HV**
63	D 7.1A Number of archaeological sites.	**0**	**HV**
64	D 7.1B Unlikeliness of the discovery of archeological remains.	**HV**	**0**
65	D7.1C Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act	**0**	**HV**
66	D7.1D Number of heritage properties identified during a field review.	**0**	**HV**
67	D 7.2A Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	**0**	**HV**
68	D 7.2B Number of heritage properties identified during a field review.	**0**	**HV**
69	D 8.1A Number of pipeline crossing.	**0**	**HV**
70	D 8.1B Vertical separation (in meters) between pipelines and subway tunnel.	**0**	**HV**
71	E 1.1 Capital costs estimated in 2005 dollars after GST Rebate $(millions).	**0**	**HV**
72	E 2.1 Estimated real estate costs in 2005 dollars.	**0**	**HV**
73	E 2.2 Number of known or potential contaminated sites within zone of influence of subway extension.	**0**	**HV**
74	E 3.1 Total annual ridership on subway extension measured in number of riders.	**0**	**HV**
75	E 3.2A Total length of track on curve (all radii).	**0**	**HV**
76	E 3.2B Reduction (addition) to total route length for existing bus services in the study area.	**HV**	**0**
77	E 3.2C Contains project elements with higher operating & maintenance needs.	**0**	**HV**

2.3 Plans

The various plans recognized during this round of evaluations are listed as follows:

For the South Subway Alignments - eight plans represented the four (east and west) alignments;

Plan 1 South 1 East Alignment;
Plan 2 South 1 West Alignment;
Plan 3 South 2 East Alignment;
Plan 4 South 2 West Alignment;
Plan 5 South 3 East Alignment;
Plan 6 South 3 West Alignment;
Plan 7 South 4 East Alignment;
Plan 8 South 4 West Alignment;

For the North Alignments - three plans represented the three north alignments;

Plan 1 North 1 Alignment;
Plan 2 North 2 Alignment;
Plan 3 North 3 Alignment;

For the Finch West Station Concepts - five plans represented the five concepts;

Plan 1 Finch West Station Option 1;
Plan 2 Finch West Station Option 2;
Plan 3 Finch West Station Option 3;
Plan 4 Finch West Station Option 4;
Plan 5 Finch West Station Option 5;

For the Steeles West Station Concepts - four plans represented the four concepts;

Plan 1 Steeles West Station Option 1A;
Plan 2 Steeles West Station Option 1B;
Plan 3 Steeles West Station Option 2;
Plan 4 Steeles West Station Option 3.

2.4 Weights

For each MATS analysis, specific weights were assigned to all applicable indicators to represent the relative importance of that factor/indicator in relation to another indicator. Referring from the earlier discussion on weights, all weights in MATS are standardized to sum up to 1.0. The weighting structure used for each of the MATS analysis is provided in Chapter 6.1 of this appendix.

2.5 Impacts

Impacts used for the analysis were obtained from data compiled by the study team. All subjective data was converted into numerical coordinates and placed on an ordinal scale with 1 representing the low end of the scale and 3 representing the high end of the scale as illustrated in Table (4).

Table 4 - Subjective Scales and Numeric Scales Assigned to Impacts

Subjective Scales	Numerical Scales
High	3
Medium	2
Low	1

2.6 Overall Scores

The study team conducted several sets of MATS analyses to evaluate each subway alignment and station concept. The overall scores for the MATS analyses were organized according to South alignments, North alignments, Finch West Station concepts and Steeles West Station concepts.

The MATS evaluations were aimed at identifying the technically preferred subway alignments and stations concepts. The study team also conducted additional MATS analyses to measure and examine the differences as well as the strengths and weaknesses of these subway alignments and station concepts.

Chapter 6 of this appendix presents the MATS analyses and overall scores/results.

3.0 Reasoned Argument Method

The Reasoned Argument Method (RAM) was the qualitative method used by the study team to evaluate the subway alignments and station concepts. RAM is simply the art of getting from one sentence to another sentence by valid moves only, based on the rules of logic. This method highlights the differences in net effects associated with the various alternatives. The advantages and disadvantages of each alternative are identified using these differences. The relative significance of the effects is then examined to provide a clear rationale for the selection of a preferred alternative.

The work undertaken for the RAM analysis is based on the detailed analysis table that utilizes a variety of measures to assess and rank the four South (east and west) and three North alignments as well as the five Finch West Station concepts and the four Steeles West stations concepts. Chapter 5 of this appendix provides details of the RAM analysis.

After identifying the set of indicators that differentiate the alignments and station concepts, the study team then developed symbols (displayed below) to rank the indicators, from most preferred to least preferred:

Most preferred				**Least Preferred**
●	◕	◑	◔	○

In addition, the relative importance of each indicator was identified by assigning a specific size to the symbol as illustrated below.

Low Importance	
Moderate Importance	
High Importance	

4.0 Data Collection and Analysis

The relevant field studies were undertaken to produce data and information for each of the four South Alignments (including Sheppard West Station), the three North Alignments (including York University Station), the five Finch West Station concepts and the four Steeles West Station concepts.

Data was compiled according to the 77 factors/measures obtained from the 38 project indicators. The study team converted all field data into standards that were compatible with the MATS software. The following section describes the studies and data compiled for each of the subway alignments and station concepts – according to factors.

4.1 Indicator A 1.1 Number of people and employees within 500m radius of main entrance (pop per ha)

4.1.1 Methodology

Information used for this indicator was obtained from the City of Toronto, Urban Development Services, City Planning, Policy and Research section.

4.1.2 Results

The existing population and employment data from 2001 are presented in Table 5.

Table 5 - Existing Population and Employment within 500m radius of main station entrance

Alignment/Station	Existing Population and Employment
S1 East & West	42.5
S2 East & West	40.01
S3 East & West	40.01
S4 East & West	48.8
N1(York University)	23.39
N2 (York University)	23.39
N3 (York University)	23.39
Finch West Option 1	86
Finch West Option 2	86
Finch West Option 3	86
Finch West Option 4	86
Finch West Option 5	86
Steeles West Option 1A	0
Steeles West Option 1B	0
Steeles West Option 2	0
Steeles West Option 3	0

4.2 Indicator A 1.2 - Number of people and employees within 500m radius of main entrance (pop per ha) – Future Estimates

4.2.1 Methodology

To determine the future population and employment numbers, the study team used the growth rate provided by the City of Toronto. The established growth rate for each of the stations areas was used. For example, the estimated growth rate for the Finch West Station area is approximately 3%. By applying that % growth, the future population and employment for each of the alignments and station concepts was estimated in table 6 and 7.

Table 6 – City of Toronto Estimates and Projections

	Given	Estimated		Given		
Location	2001	2011		1996	2021	% growth
S1	42.5	80.1		1060	3406	9%
S2	40.01	67.5		1508	4099	7%
S3	40.01	67.5		1508	4099	7%
S4	48.8	74.4		2306	5330	5%
Finch B	86.26	117.3		3176	6029	4%
York A	23.39	29.6		3628	6028	3%
Steeles	0	30.0		1817	3006	3%

4.2.2 Results

The estimates were rounded up to whole numbers for each alignment and station concept. It is important to bear in mind the fact that, the estimates for the south and north alignments were based on the numbers for stations locations within these alignments (Sheppard West Station and York University Station).

Table 7 – Future Population and Employment within 500m

Alignment/Station	Future Population and Employment
S1 East & West	80
S2 East & West	68
S3 East & West	68
S4 East & West	74
N1(York University)	30
N2 (York University)	30
N3 (York University)	30
Finch West Option 1	117
Finch West Option 2	117
Finch West Option 3	117
Finch West Option 4	117
Finch West Option 5	117
Steeles West Option 1A	30
Steeles West Option 1B	30
Steeles West Option 2	30
Steeles West Option 3	30

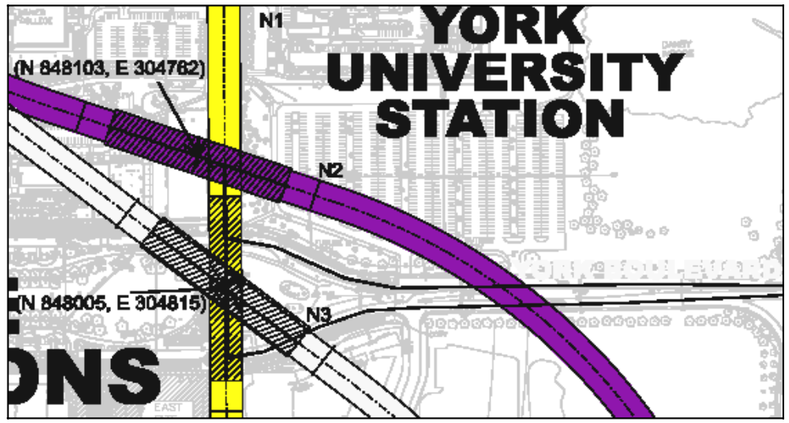
4.3 Indicator A 1.3 - Number of people and employees within 500m radius of main entrance (York University)

4.3.1 Methodology

The study team identified two station centers for York University. This is due to the different placement of the subway platforms for different alignment options. As illustrated in Figure 2, N1 (Yellow) and N3 (White) alignments both have their platform located at Ian McDonald Road within York Boulevard (N 848005, E 304815). N2 (Purple) alignment has its platform located behind the York Lanes building (N 848103, E

304762).

Figure 2 – York University Station Platforms



4.3.2 Results

To determine the number of students, faculty and staff within 500 meters walking distance of York University Station, a circle with a radius of 500m was developed around York University station location. The aim was to capture all population for buildings that are included or are touched by the circle. To determine the placement of the circle, the centroid of the estimated general station location previously mentioned was used. (See attached figure)

The centroid of the 500m circles was placed on the station centre. Any building that was located within or touching the 500m radius circle are counted as possible destinations for students and staff. The number of students and staff allocated for each building was included. The buildings that intersect the circle were also included because it was assumed that students will still walk to the targeted building even if it was a few meters farther than 500m. The results of the analysis are presented in Table 8.

Table 8 – Number of People & Employees within 500m Radius of Entrance of York University

Alignment	Number of People & Employees within 500m
N1(York University)	78000
N2 (York University)	76700
N3 (York University)	78000

4.4 Indicator A 2.1A Total length of alignments (m)

4.4.1 Methodology

The total length of alignments was measured by using the centre line of the alignments as a point of reference. For the Sheppard West Station, there was no particular alignment length. However, because the station location is associated with a particular south alignment, the station was incorporated into the south alignments and measure and categorized as such. This indicator also applies to the north alignment. In that, although the York University Station has no particular alignment length, the station location was incorporated into the

north alignments.

4.4.2 Results

The results are presented in Table 9.

Table 9 – Total Length of Alignments

Alignment	Total Length of Alignment
S1 East & West	3124, 2295
S2 East & West	3278, 3150
S3 East & West	3218, 3091
S4 East & West	2825, 2825
N1	3056
N2	2998
N3	2842

4.5 Indicator A 2.1B Estimated run times

TTC provided the information used to assess the subway run times. According to trial runs by TTC, the difference in travel time between the fastest and slowest time is imperceptible to transit riders since it is less than 20 seconds.

4.5.1 Results

This indicator was only applicable to alignments; difference between the fastest and slowest time runs was less than 20 seconds for all alignments.

4.6 Indicator A 2.2 A Length of curves with radii less than 457m (radius & length)

4.6.1 Methodology

This indicator was only applicable to alignments (south and north). The number and radii of curves of an alignment will ultimately determine the travel speed and operation of the subway. This indicator was based on the assumption that the average travel speed of trains is 80km/hr for tracks with super elevation. Travel analysis identified 457m curvature as the minimum curvature that permits trains to run at 80km/h. Thus, 457m was set as the minimum limit since any alignment curve with radii less than 457m will reduce the travel speed of trains to below 80km/hr.

4.6.2 Results

The length of curves was measured with the centre line of the alignment as a point of reference. The resulting length and the radii of the curves are presented in Table 10.

Table 10 – Length of Curves with radii less than 457m

Alignment	Length of curves with radii less than 457m
S1 East	R=330m @ 459m
S1 West	R=330m @ 459m
S2 East & West	0
S3 East & West	0
S4 East & West	0
N1(York University)	R=435 @ 688m
N2 (York University)	0

Alignment	Length of curves with radii less than 457m
N3 (York University)	0

4.7 Indicator A 2.2B Length of curves with radii between 457m and 750m (radius & length)

4.7.1 Methodology

The methodology employed in the preceding indicator was used to calculate the length of curves with radii between 457 m and 750 m. Travel analysis indicated that alignment curves with radii beyond 750m did not pose travel speed limits on trains; thus, the analyses were restricted to curves with radii up to 750m. The center line of the alignment was used as a point of reference for measuring the length of curves. To determine the total length of curves, the study team summed up the individual length of curves with radii between 457m and 750m.

4.7.2 Results

The results are presented in Table 11.

Table 11 – Length of Curves with radii between 457 m and 750 m

Alignment/Station	Length of curves with radii between 457m and 750m
S1 West	R=470m @ 692m
S1 East	R=700m @ 442m R=700m @ 589m Total: 1031m
S2 West	R=470m @ 753m R=470m @ 791m Total:1544m
S2 East	R=470m @ 753m R=700m @ 1178m Total: 1931m
S3 West	R=580m @ 929 R=470m @ 791m Total: 1544m
S3 East	R=580m @ 929m R=700m @ 1177m Total:2106m
S4 East & West	R=600m @ 719m R=600m @ 768m Total: 1487m
N1(York University)	R=565m @ 444m R=500m @ 793m R=565m @ 375m Total: 1612m
N2 (York University)	R=500m @ 576m
N3 (York University)	R=750m @ 768m R=600m @ 545m Total: 1313m

4.8 Indicator B 1.1 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from street bus bay to centre to subway platform.

4.8.1 Methodology

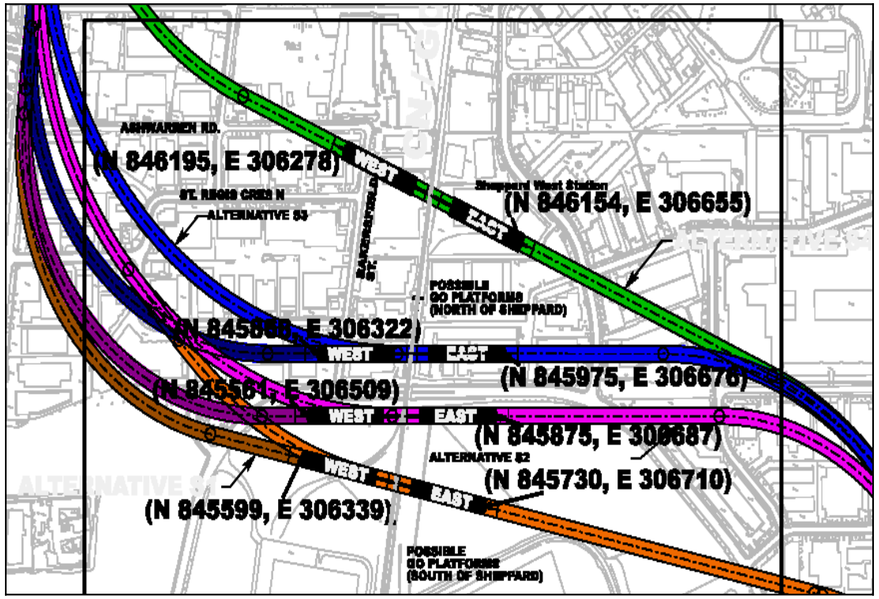
This indicator applies to the South (including Sheppard West Station) alignments and the Finch and Steeles West Stations. It does not apply to the York University Station because this station is expected to attract primarily walk-in traffic from the campus; as such it is not affiliated with any specific on-campus bus bays.

4.8.2 Results

South (Sheppard West) Alignments

It was assumed that the Sheppard Station centre will be the end of each station platform, with the GO/Bradford line running through the center of the station platform (Figure 3). Thus, the main entrance used by pedestrians will be at both ends of each station platform and not from the connecting GO/Bradford line entrance.

Figure 3 - South Alignment Coordinates



To calculate the total walking time from the bus to the station platform, the study team based the walking time on 1.2 m/s measured from the on-street bus bay to the centre of subway station platform. In addition, two bus stops were assumed for this calculation. The first stop would be at the intersection of Sheppard Avenue West and Chesswood Avenue. The second stop would be at the intersection of Tuscan Gate and Sheppard Avenue West. The resulting distance and time for the South Alignments are listed in Table 12.

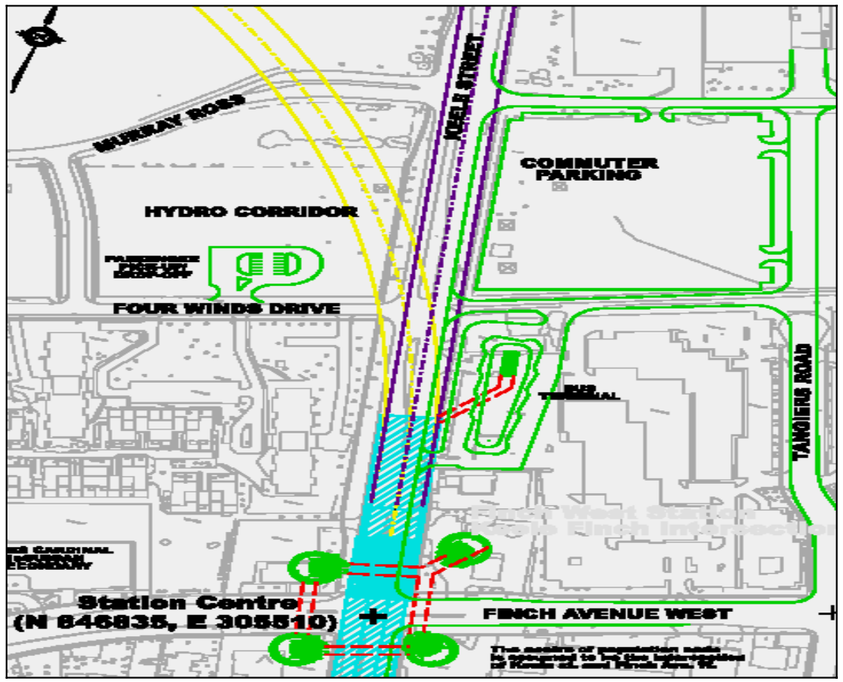
Table 12 – Transfer time from bus to subway platform (South Alignment)

	South Routes (Including Sheppard West Station)							
	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East
	Orange		Pink		Blue		Green	
Distance	156	273	104	104	225	233	602	346
Time Travelled	2	4	1	1	3	3	8	5

Finch West

The same assumption was made for the Finch West Station, the station centre was assumed to be at the intersection of Keele Street and Finch Avenue West. For measurement purposes, it was assumed that all pedestrian paths terminate at the station centre (Figure 4- N 846835, E 305510).

Figure 4 – Finch Station Coordinates



The transfer time from bus to subway was measured in seconds based on the assumption that pedestrian travel at 1.2 m/s with the addition of a 10 second premium required for every vertical movement. A vertical movement is the course of movement from one structural level to another. The travel distance from the bus to the bus platform was calculated by taking the average of the farthest bus bay and the nearest bus bay to the centre of the platform. The walking distance from bus platform to the subway platform is measured using the distance from the centre of the elevator to the station centre point. For all options, pedestrians are required to

descend two structural levels to reach the subway platform. The results are provided in table 13

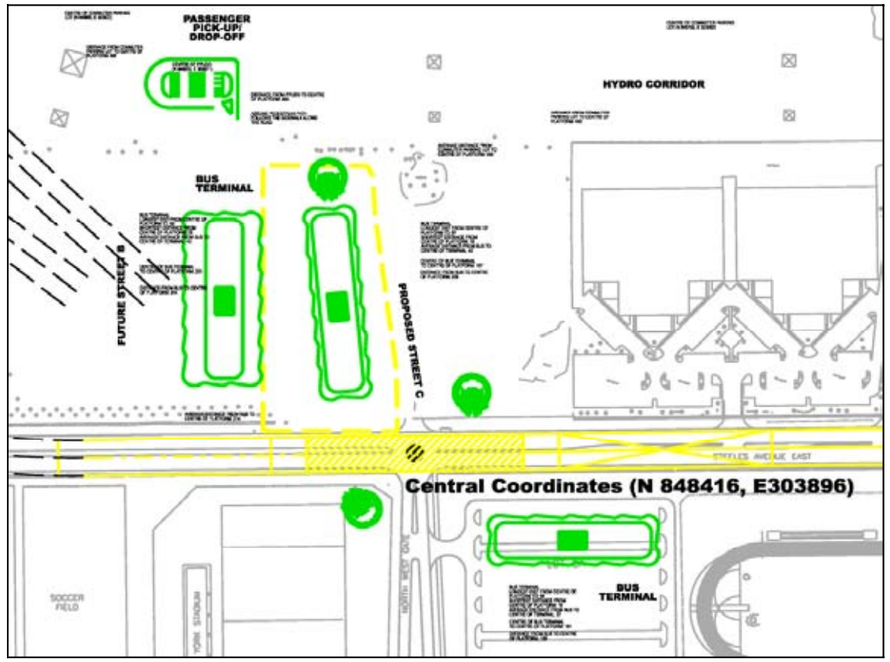
Table 13 – Transfer time from bus to station platform (Finch West Station Concepts)

	Bus to Platform			Speed:	1.2 m/s
	Option 1	Option 2	Option 3	Option 4	Option 5
Bus to Centre of Platform (m)	31.5	31.5	31	31	31
Entrance to Station Centre (m)	232.5	199.3	100	105.5	166.6
Total Walking Time (s)	220	192	109	114	165
Number of Levels crossed	2	2	2	2	2
Delay for Each Level (s)	10	10	10	10	10
Total Transfer Time (s)	240	212	129	134	185
Time (min)	**4.0**	**3.5**	**2.2**	**2.2**	**3.1**

Steeles West

For the Steeles Avenue West station, the study team again assumed that the station centre was at the intersection of Steeles Avenue West and Northwest Gate; for measurement purposes it was also assumed that all pedestrian paths terminates at the station centre (N 848416, E 303896).

Figure 5 – Steeles Station Coordinates



The transfer time from bus to subway was measured in seconds based on the assumption that pedestrian travel

at 1.2 m/s with the addition of a 10 second premium required for every vertical movement. A vertical movement is the course of movement from one structural level to another. The travel distance from the bus to the bus platform was calculated by taking the average of the farthest bus bay and the nearest bus bay to the centre of the platform. The walking distance from bus platform to the subway platform was measured using the distance from the centre of the elevator to the station centre point. For all options, pedestrians are required to descend two structural levels to reach the subway platform. The results are indicated in Table 14.

Table 14 – Transfer time from bus to station platform – Steeles West Station Concepts

	Bus to Platform		Speed:	1.2 m/s
	Option 1A	Option 2	Option 1B	Option 3
Bus to Centre of Platform (m)	37-43	42-89	38-44	60
Entrance to Station Centre (m)	151-201	179-298	157-177	181
Total Walking Time (s)	157-203	184-323	167-179	201
Number of Levels crossed	2	2	2	3
Delay for Each Level (s)	10	10	10	10
Total Transfer Time (s)	177-223	204-343	187-199	231
Time (min)	**2.9-3.7**	**3.4-5.7**	**3.1-3.3**	**3.8**

4.9 Indicator B 1.2 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform

4.9.1 Methodology

This indicator was only applicable to the Sheppard West Station located within the South Alignments. As explained earlier, it was assumed that the Sheppard Station Centre will be the end of each station platform, with the GO/Bradford line running through the center of the station platform (Figure 3). Thus, the main entrance used by pedestrians will be at both ends of each station platform and not the entrance connecting GO/Bradford to the subway.

4.9.2 Results

The transfer time from GO Rail to subway was calculated by assuming the average walking speed of a pedestrian is 1.2 m/s and that passengers will be traveling from the centre of the subway platform to the centre of the GO Rail Platform. Table 15 presents the results of the analysis. It should be noted that for station concepts that are located south of Sheppard Avenue, the GO Rail platform is located within Downsview lands, south of Sheppard. The station concepts that are located north of Sheppard Avenue will connect to a GO Rail platform located north of Sheppard Avenue.

Table 15 - Transfer time from GO Rail to subway platform at Sheppard West Station.

GO Rail to Subway					Average Speed:		1.20 m/s	
Stations	S1 West	S2 West	S3 West	S4 West	S1 East	S2 East	S3 East	S4 East
Distance	179	288	199	275	176	278	201	287
Time (s)	149	240	166	229	147	231	168	239
Time (min)	2.5	4.0	2.8	3.8	2.4	3.9	2.8	4.0

4.10 Indicator B 1.3A Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [36 Finch]

4.11 Indicator B 1.3B Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(min) [41 Keele]

4.10 and 4.11.1 Methodology

These two indicators are exclusive to the Finch West Station concepts. The data obtained for these station options were based on the net additional delay time for the passengers on the two bus routes, 36-Finch West and 41-Keele West, at the Finch West Station as a result of additional routing of buses into the proposed station.

The delay time for each station concept at Finch West Station was established on the individual transit route paths, delay for specific movements at key intersections and additional travel time from one intersection/entrance to another. The calculated net delay time for each respective Finch West Station concept scenario was the total travel time required to travel a section of the transit route within the study area of the Finch West Station, subtracted by the total travel time required to travel the same route without the construction of Finch West Station.

The resultant time was the delay time that the passengers would experience due to the development of the future Finch West Station. The higher of the individual elemental times during the a.m. or p.m. peak hours was used in the calculation. Other assumptions made in for this indicator include the following:

- The travel speed was assumed to be 30km/h;
- Bus internal circulation and dwell time within the station was assumed to be the same for all options, so the circulation/dwell time factor was excluded in the calculations.

In order to facilitate comparison and to maintain consistency, the study team selected points of reference to calculate the resulting delay times. The points of reference for the 41-Keele West bus route was the Keele Street/Murray Ross Parkway intersection to the north, and the Keele Street/Toro Road intersection to the south. Similarly, the points of reference for the 36-Keele West bus route were the Finch Avenue/Romfield Drive intersection to the west, and the Finch Avenue/Tangiers Road intersection to the east.

4.10.1 4.11.2 Results

Table 16 summarizes the resultant delay times for each of the station alternatives at the Finch West Station.

Table 16 –Delay time for Passengers from the 36 –Finch West Bus & the 41 –Keele Bus

	Delay Time				
	Finch West Station				
Bus Route	Option 1	Option 2	Option 3	Option 4	Option 5
36-Finch West	5.2	4.8	8.4	5.2	6.0
41-Keele	3.0	3.8	3.1	3.5	1.6

4.12 Indicator B 1.4 Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform (min)

4.12.1 Methodology

This particular indicator was developed for the Finch West Station concepts. It measured the potential of an option to provide connections to a possible LRT in the hydro corridor. The assumption was that there will be future LRT service running along similar lines (Finch Hydro Corridor) to the bus rapid transit proposed.

4.12.2 Results

An assessment of the options resulted in the following conclusions:

- Option 3 and 4 will deter the potential to provide connections due to the restrictions in the number of alignments available for connection purposes. Once option 3 or 4 is chosen, Option N1, which has higher potential to connect to the LRT will not be available. Therefore, Options 3 and 4 are considered as having a **low** relative potential.
- Option 5 is considered as having **medium** relative potential to connect to the LRT because of the considerable distance away from the hydro corridor although (unlike options 3 and 4) it does not cancel out an alignment.
- Option 1 and 2 are considered to have the **highest** relative potential in connection to future LRT.

4.13 Indicator B 2.1 Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.

4.12.2 Methodology

The premise of this calculation was based upon the assumption that the average cyclists travel at 15km/hr (4.16m/s).

4.13.2 Results

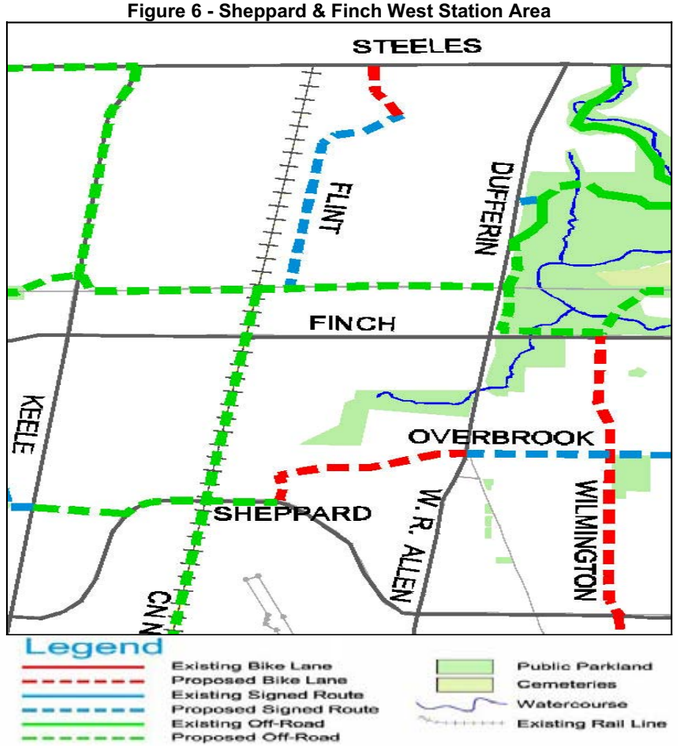
South Alignments (including Sheppard West Station)

As presented in the Toronto Bike Plan (Figure 6), the closest bike path and proposed off-road cyclist facilities are identified along the CN Rail line and another on Sheppard Avenue West. The maximum distance of travel required for cyclists to reach the station is 200 m. As the proposed bike paths and off-road cyclist facilities will be along the CN Rail line, no travel time was recorded in this case; cyclists will be traveling from the CN Rail line (facilities) to the adjoining main pedestrian entrance (of the station). Therefore the transfer time from the bike path to the station was taken as 0 sec for all station options.

Finch West Station

According to the Toronto Bike Plan (see Figure 6) the closest bike path would be a proposed off-road designation at Keele and Murray Ross along the hydro corridor for the Finch West Station passengers. Therefore, the intersection of Keele Street and Murray Ross was used as the starting point of the cyclist travel path while the station center was used as a termination point.

Figure 6 - Sheppard & Finch West Station Area



Source: Toronto Bike Plan – May, 2001-Keele/Finch Area

Based on these assumptions, all options will allow cyclists to reach the Keele/Finch intersection in just over a minute (See Table 17).

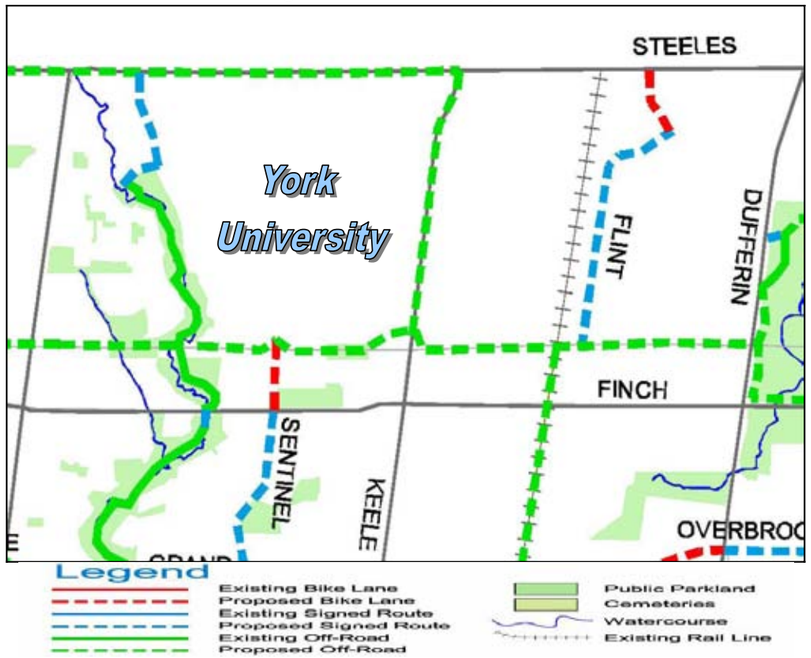
Table17 – Cyclist time for Finch West Station

	Bike Path			Speed:	4.2 m/s
	Option 1	Option 2	Option 3	Option 4	Option 5
Entrance to Bike Path	281	281	281	281	281
Transfer Time (s)	67.44	67.44	67.44	67.44	67.44
Time (min)	1.1	1.1	1.1	1.1	1.1

North Alignments (including York University Station)

As illustrated in Figure 7 (Toronto Bike Plan 2001), the closest connection from York University station cyclist centers to bike paths are the proposed off-road facilities on Keele Street.

Figure 7 - York University Area



Source: Toronto Bike Plan – May, 2001- York University Area

Since York Boulevard has divided lanes, the distance from Keele Street bike path was measured by taking the average of both lanes to the station centers. The average distance for station centre that touches N1 and N3 is 517.5m (510.4m +524.6m). The average distance for station centre that touches N2 is 578.2m (528.9m + 627.5m). The average speed for a cyclist was assumed to be 15km/hr (4.2 m/s); the calculations for NI, N2 and N3 are presented in Table 18.

Table 18 – Cyclist Time for York University

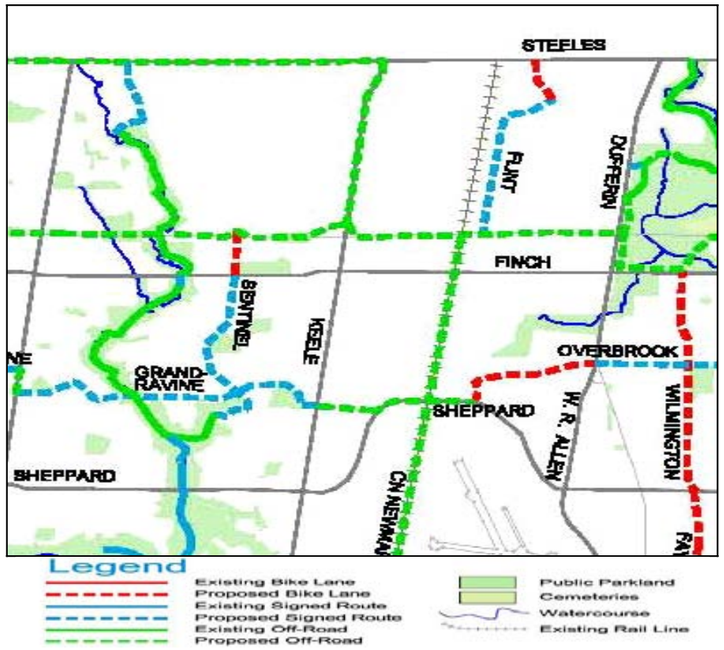
	Bike Path	Speed:	4.2 m/s
	N1	N2	N3
Entrance to Bike Path (m)	517.5	578.2	517.5
Transfer Time (s)	124.2	138.768	124.2
Time (min)	**2.1**	**2.3**	**2.1**

Steeles West Station

In the case of Steeles West Station concepts, the Toronto Bike Plan (Figure 8) indicates that there is a bike

path along Steeles Avenue which coincides with the assumed centre of the station. Therefore the transfer time from the bike path to the station was taken as 0 sec for all station options as shown in Table 19.

Figure 8 – Toronto Bike Plan – Steeles Station Area



Source: Toronto Bike Plan – May, 2001-Steeles / Northwest Gate Area

Table 19 – Cyclist Time for Steeles West Station

	Bike Path			Speed:	4.2 m/s
	Option 1A	Option 2	Option 1B	Option 3	Option 1A
Entrance to Bike Path	0	0	0	0	0
Transfer Time (s)	0	0	0	0	0
Time (min)	**0**	**0**	**0**	**0**	**0**

4.14 Indicator B 2.2A Walking time based on 1.2 m/s from PPUDO/taxi stands to closest station entrance(s).

4.14.1 Methodology

This indicator applies to both Finch and Steeles West Stations. The station centre was assumed to be at the intersection of Keele Street and Finch Avenue West. For measurement purposes, an assumption was made

that all pedestrian paths terminate at the station centre for Finch West Station (Figure 4 - N 846835, E 305510).

4.14.2 Results

To calculate the walking time, the study team assumed that the averaging walking speed of a person was approximately 1.2m/s. The distance from the centre of the Passenger Pick-up and Drop-off (PPUDO) facilities was estimated (N 847093, E 305373) and the walking path distance to the station centre point was then measured from the calculated point to the station centre. Since for all stations, the PPUDO are located at the same place, it was determined that all the options have the same transfer time from PPUDO to the station entrance. The results are indicated in Table 20.

Table 20 – Walking time from Passenger Pick-up and Drop-Off facilities

	PPUDO to Entrance			Speed:	1.2 m/s
Finch West Stations	Option 1	Option 2	Option 3	Option 4	Option 5
Distance (m)	366	366	366	366	366
Time (s)	305	305	305	305	305

For Steeles West Stations, the results were calculated using the same assumption (that the averaging walking speed of a person was approximately 1.2m/s). The distance from the centre of the PPUDO was then estimated and the walking path distance to the station centre point was measured from the centre of the PPUDO to the station centre. The results are presented in Table 21.

Table 21 – Walking time from Passenger Pick –up and Drop – Off Facilities

	PPUDO to Entrance		Speed:	1.2 m/s
Steeles West Stations	Option 1A	Option 2	Option 1B	Option 3
Distance (m)	455	120	404	445
Time (s)	379	100	337	371

4.15 Indicator B 2.2B Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance(s)

4.15.1 Methodology

This indicator applies solely to Finch and Steeles West Stations, as these stations will have commuter parking facilities. This indicator was calculated using the average walking speed of a person and the distance from the commuter parking facility. Similarly, the study team used the assumption that the average walking speed of a person was 1.2 m/s. Thus, the walking time from commuter parking to station center for each option was estimated by calculating the distance traveled from the centre of the commuter parking facility to the station centre.

4.15.2 Results

Since the commuter parking facilities are the same for all the Finch West Station options, the transfer time for pedestrians from commuter parking to station entrances are equal. The results are indicated in Table 22.

Table 22 – Walking time from Commuter Parking Facilities

	Parking to Entrance			Speed:	1.2 m/s
Finch West Station	Option 1	Option 2	Option 3	Option 4	Option 5
Distance	448	448	448	448	448
Time (s)	373	373	373	373	373

In the same way, the transfer time from commuter parking at Steeles West Station was estimated by calculating the distance traveled from the centre of the commuter parking facility to the station centre. The varied distances presented in Table 23 reflect the significant differences between the commuter packing facilities at the Steeles West Station. Based on these distances, the calculations for the walking time was determined and presented in Table 23.

Table 23 – Walking time from Commuter Parking Facilities

	Parking to Entrance		Speed:	1.2 m/s
Steeles West Station	Option 1A	Option 2	Option 1B	Option 3
Distance	495	409	542	498
Time (s)	413	341	452	415

4.16 B 2.3A Weather protected (yes/no) connection from Sheppard Avenue to entrance building

4.16.1 Methodology

Each station concept was evaluated according to its ability to provide weather protection for passengers – as per its surface station facilities.

4.16.2 Results

An assessment of the options resulted in the following conclusions:

- Due to the proximity of South 2 and South 3 options, tunnels could be used to establish connections for pedestrians from Sheppard Avenue to the entrance building. Therefore, only options 2 and 3 are identified as weather protected.
- Based on the surface facilities offered at the Finch West Station, it was assumed that there will be no weather protection for pedestrians/passengers.
- It is very likely that all the entrances in York University are weather protected and may even connect to existing built forms such as York Lanes.
- Only option 2 of Steeles West Station is not weather protected. This is due to the restrictions of the Hydro power lines. Option 2 encroaches upon the Hydro lands and since construction of any built form under the power lines is a concern, there will not be any weather protection.

4.17 B 2.3B Entrance type (staffed/automated)

4.17.1 Methodology

Each station concept was evaluated according to its ability to provide staffed or automated entrance facilities.

4.17.2 Results

All stations will include both staffed and automated entrances. Location of these entrances features will be confirmed at the next phase of the EA process.

4.18 B 2.3C Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement. Max time (min).

4.18.1 Methodology

The study team recognizes that the walking time from pedestrian entrances/bicycle racks (as bicycle racks will be located at the pedestrian entrances) to subway platforms is an element that could be used to determine the quality of walking environment of the subway. Thus, it was essential to consider the longest distance from

the pedestrian entrance to the centre of station platform; assuming 1.2m/s walking speed and 10-second premium for every vertical movement.

4.18.2 Results

South Alignments including Sheppard West Station

- Based on the assumption that Sheppard West Station entrances will be on top either ends of the platform, the traveling time was calculated at 2 levels (20 seconds) and the traveling distance of 100m (83 seconds) to the centre of the platform. On average, it took 2 minutes for the pedestrian to travel from station entrance (bicycle rack) to the centre of the subway platform.

North Alignments (including York University Station)

- In the case of the North Alignments, it was assumed that the station entrances will be extremely close to the subway station. As a result of the complexity and the sensitivity of the surrounding area in York University, the station entrances are located in such a way that they will cause minimal disturbance and achieve at the same time, the closest distance to the subway platform. All station layouts are currently the same for this station, with no distinguishable differences. This indicator was therefore not applicable to this station, as all the concepts for the York University station will have the same traveling distance from pedestrian entrance to subway platform.

Finch West Station

- For the Finch West Station, the study team measured the longest distance from the pedestrian entrance to the centre of platform; assuming 1.2 m/s walking speed and 10-second premium for every vertical movement. The calculations for walking time from pedestrian entrance/bicycle racks to subway platform for the Finch West Stations concepts are presented in Table 24.

Table 24 – Walking distance from pedestrian entrance/bicycle rack – Finch West Station

	Bike Park to Platform			Speed:	1.2 m/s
	Option 1	Option 2	Option 3	Option 4	Option 5
Max Bike Parking to Centre of Platform (m)	104.937	104.65	80	94.75	101
Total Walking Time (s)	87.4475	87.208333	66.666667	78.958333	84.166667
Number of Levels crossed	2	2	2	2	2
Delay for Each Level (s)	10	10	10	10	10
Total Transfer Time (s)	107	107	87	99	104
Time (min)	1.8	1.8	1.4	1.6	1.7

Steeles West Station

- All entrances for the proposed Steeles West station are similar. The study team concluded that this indicator was not applicable as there were no differences between the walking time from pedestrian entrance to subway platform for all the station concepts.

4.19 B 3.1A Number of natural heritage features.

4.19.1 Methodology

The environmental/natural heritage features identified within the study area included vegetation communities, watercourses and waterbodies. For this indicator, the analysis studies focused on natural heritage features located on-site which refers to natural heritage features located within 30m wide right-of-way of the center line of each alternative subway alignment. The natural heritage features (Table 25) that were located within the alignments are based on Ecological Land Classification (ELC).

Using Geographic Information Systems (GIS) software, the footprint for the three proposed subway alignments north of Steeles Avenue was laid over a layer containing natural heritage features and the number of overlaps was calculated.

4.19.2 Results

The number of natural heritage features located along each subway alignment is presented in Table 25.

Table 25 - Natural Heritage Features

Alignment	Number of Vegetation Communities	Community Types (Scientific)
North of Steeles Avenue Alignment 1	2	CUM1-1 (0.12 ha); CUT1/CUW1 (0.71 ha) – *cultural meadow*
North of Steeles Avenue Alignment 2	2	CUM1-1/AGR (0.90 ha); CUT1/CUW1 (0.34 ha) – *cultural meadow*
North of Steeles Avenue Alignment 3	2	CUM1-1/AGR (0.55 ha); CUT1/CUW1 (0.53 ha) – *cultural meadow*

4.20 B3.1B Area of groundwater discharge (ha) (100m zone of influence).

4.20.1 Methodology

The study area is drained by the Black Creek (west) and the West Don River (east). Geology/subsurface stratigraphy, hydrogeology data of the study area was used to determine the areas of groundwater discharge within the zone of influence of the subway extension. The area was calculated in hectares. Due to the nature of the study area, it was observed that almost all the subway alignments were located partially within areas of groundwater discharged.

The key objective was to identify the total area of groundwater discharge within the zone of influence for each proposed subway alignment. For this indicator, calculations considered groundwater discharge areas located within the zone of influence which includes both on-site and off-site areas. The total area of groundwater recharge/discharge located within 30m wide right-of-way and adjacent areas up to 100m wide beyond the right-of-way of the subway alignment was calculated.

4.20.2 Results

Using GIS software, an outline of each of the three proposed subway alignments north of Steeles Avenue was laid over a layer containing geology/subsurface stratigraphy and hydrogeological data. The total size of area of groundwater discharge within the zone of influence of the subway extension was determined by summing up all overlapping areas of groundwater discharge located within each subway alignment (Table 26).

Table 26 – Ground Water Discharge

Alignment	Total Area
North of Steeles Avenue Alignment 1	32.27 ha
North of Steeles Avenue Alignment 2	24.2 ha
North of Steeles Avenue Alignment 3	26.2 ha

4.21 B 3.1C Number of residences, businesses and community/recreational/ institutional facilities.

In line with the previous indicator (environmental features potentially affected by a future subway extension into York Region), the analysis extended to the socio-economic features located in the study area, including residences, businesses and community/recreational/institutional facilities. Socio-economic features located within the zone of influence were counted (4.21 - methodology) and the sum for each alignment is presented in Table 27.

4.22 B3.1D Number of cultural heritage features (100m zone of influence).

4.21 & 22.1 Methodology

Only the cultural heritage features identified under *Ontario Heritage Act* were incorporated in the analysis. During the field investigations, the focus was on cultural heritage features, residential, businesses and community/ recreational/institutional facilities located within the zone of influence which includes both on-site and off-site areas.

4.21 & 22.2 Results

Using GIS software, an outline of each of the three subway alignments north of Steeles Avenue was laid over a layer containing cultural heritage features and land use designations/features. Cultural heritage features, residences, businesses, community/recreational and institutional facilities located within the zone of influence which includes both on-site and off-site areas (areas within 30m wide right-of-way and adjacent areas up to 100m wide beyond the right-of-way of the subway alignment) was traced and counted. Table 27 presents the results.

Table 27 - Cultural Heritage Features

Alignment	Number of residences, businesses and community/ recreational/ institutional facilities	Number of Cultural Heritage Features
North of Steeles Avenue Alignment 1	1 *(York University)*	4 *(York University, Beechwood Cemetery, Pioneer Village North, Pioneer Village)*
North of Steeles Avenue Alignment 2	0	1 *(Beechwood Cemetery)*
North of Steeles Avenue Alignment 3	0	1 *(Beechwood Cemetery)*

4.23 B 3.1E Compatibility with planned land-use / Ability to modify station to reflect changing bus demands.

4.23.1 Methodology

It is important to note that this indicator is only applicable to the 3 North Alignments and to the Steeles West station options. It is expected that transit facilities and alignment options will impact future development potential along the Steeles corridor. It is a basic principle that where development is encumbered by a subway station, an underground alignment or by at-grade transit facilities, construction becomes more complex, more costly and subsequently less likely. As such, the options that minimize any impediments to development are preferred. Using the methodology explained in section 4.27.1 (Objective C) the study team analyzed the land-

use along Steeles West Station and North of Steeles Avenue.

4.23.2 Results

Table 28 presents the results of the data collection.

Table 28 – Land use located within Study Area

Alignment/ Station	Compatibility with Planned Land- Use	Ability to modify Station to reflect changing bus demands
Steeles West Station Option 1A	N/A	High
Steeles West Station Option 1B	N/A	High
Steeles West Station Option 2	N/A	Medium
Steeles West Station Option 3	N/A	Low
North of Steeles Avenue 1	High *Facilitates expansion into York Region along VCC protected corridor .Supports intensified development along Steeles. N1 conforms to the alignment in the City of Vaughan Planning documents.*	N/A
North of Steeles Avenue 2	High *Facilitates expansion into York Region along VCC protected corridor. Supports intensified development along Steeles.*	N/A
North of Steeles Avenue 3	High *Facilitates expansion into York Region along VCC protected corridor. Supports intensified development along Steeles*	N/A

4.24 B 3.2A Total length of alignment (m).

4.25 B 3.2B Length of curves with radii less than 457 m.

4.26 B3.2C Length of curves with radii between 750 m and 457 m.

4.24 to 26.1 Methodology

The same methodology and assumptions used for indicators 4.6 and 4.7 was employed for these indicators. The center line of the alignment was used as the reference point.

4.24 to 26.2 Results

The total length of alignments was also calculated. There are no curves with radii less than 457m. The results for length of curves with radii between 457m and 750m are presented in Table 29.

Table 29 – Length of Alignment beyond Steeles Avenue West

Alignments North of Steeles	N1	N2	N3
Total Length of Alignment (m)	2188	1945	1996
Length of Curves with radii between 457 and 750m Time (min)	R=500m @ 793m	0	R=600m @ 545m

4.24 Objective C (Indicators 4.27 to 4.29)

4.24.1 Methodology

A detailed presentation of the planning and land –use evaluations are documented in Appendix J. In order to identify land use and development opportunities within the study area, base information was developed by the study team during the data collection process. Several land use and planning assumptions and procedures were made and followed including:

1. **Establishment of the zone of influence**:

To carry out planning and urban design analyses, "zones of influence" were established adjacent to the alignments and station locations to assist in understanding the level of impact on stable land uses and the comparative ability to capture lands with identified redevelopment potential. Two zones of influence were utilized:

- *Subway alignments* - a 100 metre zone on either side of each of the subway alignment options was used as the basis for understanding land use impacts. This zone was used because it was consistent with the zone of influence used in other criteria/indicator evaluations; and,

- *Station locations* - a 500 metre radius from each of the station location options was used to assess the relative level of redevelopment potential captured by each option. This zone is typically used by the TTC and the City of Toronto to evaluate the maximum ridership potential in proximity to subway stations. It represents a walking distance that will attract the highest potential number of transit users from the adjacent community. It was also reasonable to assume that the maximum stimulative impact for redevelopment attributable to the establishment of a subway station would also be within the 500 metre distance of the actual station.

When both zones of influence are combined, it provides a boundary for the preparation of the Development Potential Map.

2. **Preparation of the Development Potential Map**

Based on the combined zones of influence, an analysis of the relative redevelopment potential of various locations was carried out. This analysis was based partly on existing planning policy and recent planning studies, partly on an understanding of development economics within the area, and partly based on discussions with various major landowners in the area (York University and Parc Downsview Park).
The categories are as followings:

- *Stable Residential* - this category is intended to recognize existing stable residential neighbourhoods that are not expected to accommodate any significant redevelopment in the long-term. The areas identified are included in the City's new Official Plan as "Stable Residential", and are given a level of protection through planning policy that will make major redevelopment difficult;
- *Stable Employment* - this category is intended to recognize the existing Downsview industrial area. While the existing employment generating land uses are expected to evolve over time, major redevelopment is not anticipated, even in the long-term. The area is stable, and is functioning economically, both of these factors mitigate against substantial redevelopment. In addition, the City's new Official Plan provides this employment area with protection against the introduction of non-employment generating land uses;

- *Redevelopable* - this category identifies areas that are either recognized in various planning studies for urban redevelopment - Vaughan Official Plan Amendment 620, the Keele Street Redevelopment Study or the new City of Toronto Official Plan designation for "Avenues"; or, for the lands located adjacent to Sheppard Avenue, they are considered redevelopable because they are at the edge of a stable employment area, which are typically more susceptible to redevelopment than internal sites, or are part of Parc Downsview Park, which, in the long-term, is expected to stimulate redevelopment potential in association with park development and investment in the subway system. To be considered as "Redevelopable", the areas had to have direct frontage on the major road network (Sheppard Avenue, Allen Road/Dufferin Street, Keele Street or Steeles Avenue) and have a minimum lot depth of 50 meters, which is a depth that can support significant urban redevelopment. These areas identified as "Redevelopable" are considered the key areas where substantial urban redevelopment has the potential to occur, and can be stimulated by the development of a subway station;
- *Parc Downsview Park* - this category identifies lands controlled by the federal government (either Parc Downsview Park or the Department of National Defence) that are expected to be used for park or for DND purposes. These lands are not expected to have any substantial redevelopment potential in the long-term;
- *Hydro Corridor* - this category identifies lands that are currently used as Hydro Corridors. There are two east west Hydro Corridors, one at the South end of York University, north of Finch Avenue, the other north of Steeles Avenue. These lands may be used for transit related facilities but have no redevelopment potential for urban land uses in the long-term;
- *York University - Stable* - this category identifies lands that are part of the York University campus that are already developed and considered stable; and,
- *York University - Development Potential* - this category identifies lands that are part of the York University campus that have identified redevelopment potential.

The study team employed the above mentioned assumptions in the field studies. Field data was collected according to the amount of area and features that were located within the zone of influence for each subway alignment and station concept as well as the amount of the redevelopment land encumbered by the proposed station facilities. Refer to the Appendix J- Socio-Economic and Planning Report prepared by The Planning Partnership for a detailed evaluation and documentation of the field studies.

4.27 to 4.29.2 Results

The results of the socio-economic and planning analysis are presented in Table 30. The results describe the following:

- amount of area identified as redevelopment with the zone of influence;
- amount of redevelopment frontage within station zone of influence; and,
- amount of redevelopable frontage encumbered by transit facilities.

Table 30 – Land Use and Development Opportunities

Alignment/ Station	Amount of Area Identified as redevelopment within zone of Influence (ha)	Amount of redevelopment frontage within station zone of influence (m)	Amount of redevelopable frontage encumbered by transit facilities (m)
S1 East & West	28, 26	2210, 2170	350, 330
S2 East & West	26, 25	2080, 2040	810, 700
S3 East & West	22, 23	1900, 1920	730, 650
S4 East & West	10, 18	1240, 1580	170, 170
N1	*Equal Potential*	21	170

Alignment/ Station	Amount of Area Identified as redevelopment within zone of Influence (ha)	Amount of redevelopment frontage within station zone of influence (m)	Amount of redevelopable frontage encumbered by transit facilities (m)
N2	*Equal Potential*	21	190
N3	*Equal Potential*	21	240
Finch West Option 1	*Equal potential*	*Equal Frontage (approx. 700m)*	125
Finch West Option 2	*Equal potential*	*Equal Frontage (approx. 700m)*	70
Finch West Option 3	*Equal potential*	*Equal Frontage (approx. 700m)*	195
Finch West Option 4	*Equal potential*	*Equal Frontage (approx. 700m)*	195
Finch West Option 5	*Equal potential*	*Equal Frontage (approx. 700m)*	15
Steeles West Option 1A	*Equal potential*	*Equal Frontage (approx. 400m)*	290
Steeles West Option 1B	*Equal potential*	*Equal Frontage (approx. 400m)*	290
Steeles West Option 2	*Equal potential*	*Equal Frontage (approx. 400m)*	90
Steeles West Option 3	*Equal potential*	*Equal Frontage (approx. 400m)*	90

4.30 C 2.1A Number of direct connections between subway facilities, parking lots and bus facilities for pedestrians and cyclists.

4.30.1 Methodology

This indicator applies exclusively to Finch and Steeles West Stations. The station alternatives were evaluated on the basis of the number of impediments to the free movements of pedestrians at the proposed stations concepts. In order to give a quantitative measure for this criterion, a calculation were undertaken to determine the number of impediments to the free movement of pedestrians based on a review of available pedestrian count data at study intersections; and proposed bus volumes at the bus entrances of the Finch West and Steeles West Stations. The resultant number of the impediments was defined as the cross-product of the number of buses and the number of pedestrians at the proposed stop-controlled station accesses along the collector and arterial roads. The number of impediments to the free movement of pedestrians is measured in units of 'bus-pedestrians'. Pedestrian crossing and bus turning movements that occur simultaneously at the stop-controlled entrances were considered.

Bus volumes for the station alternatives were based on the total of inbound and outbound resultant transit traffic volumes at the bus station accesses along the arterial roads. The pedestrian volumes were based on available pedestrian count data (for more details - refer to Traffic Impact Report and Bus Network and Bay Demands at Station Report prepared by URS Inc). Several assumptions were made in order to establish a consistent calculation methodology for comparison purposes. The pedestrian volume that may potentially impede or be impeded at the bus station accesses was identified as the number of pedestrians crossing on the

two adjacent approaches of the nearest intersection to the station. It was assumed that approximately half of the pedestrian volumes on these two approaches at the adjacent intersection would potentially cross the bus station entrance. Therefore, a factor of 0.5 is applied in the pedestrian volumes on these two approaches calculations.

Most recent available pedestrian count data for the key intersections within the study area was obtained from the City of Toronto. This data was collected for the a.m. and p.m. peak hours and reviewed for consistency. It should be noted that the pedestrian count data for the p.m. peak hour is generally higher than that of the a.m. peak hour. For the purpose of this indicator, the pedestrian count data for the p.m. peak hour is used in the calculation of the number of impediments.

4.30.2 Results

Table 31 summarizes the number of impediments to free movements of pedestrians for each option at the Finch West and Steeles West Stations. Detailed calculations are in the Traffic Impact Report.

Table 31 Number of Impediments to the Free Movement at Key Stop-controlled Entrances at Collector and Arterial Roads

	No. of Buses	No. of Pedestrians	No. of Impediments (Bus-Pedestrians)
Finch West Station			
Option 1	62	150	9,300
Option 2	208	43	8,944
Option 3	208	279	20,384
Option 4	208	247	31,200
Option 5	208	149	12,933
Steeles West Station			
Option 1A	225	24	5,400
Option 1B	225	24	6,648
Option 2	-	-	-
Option 3	308	24	2,306

4.31 C 2.1B Active Surveillance (low, medium, high)

4.31.1 Methodology

The study team observed that in general, the presence of pedestrian; vehicular traffic; operating business; institutions; occupied residences; etc.; provides 'active surveillance' within an station location; which tend to discourage crime and promote a sense of community within the station location. In order to calculate the level of protection present at a station entrance, several positive measures were used including:

- Proximity of Station surface components to major intersection: for example high volume of pedestrian and vehicular traffic during most of the day and night provides constant active surveillance.
- Proximity of Station surface components to each other: for example, assuming there is unobstructed sight line from one component to another, the presence of passengers and TTC personnel reinforces active surveillance.
- Proximity or adjacency of connecting elements of the Station to established business, institutions or residences: for example, concentration of these along the route from drop-off / parking to station entrances provides active surveillance.
- Station layout and location of staffed fare collection were also considered to determine the level of active surveillance.

4.31.2 Results

The level of protection - active surveillance was calculated in terms of high, medium and low, the results are as follows:

Table 32 – Active Surveillance

Alignment/ Stations	Active Surveillance
S1 East	Low
S1 West	Low
S2 East	High
S2 West	High
S3 East	High
S3 West	High
S4 East	Medium
S4 West	Medium
N1	High
N2	High
N3	High
Finch West Option 1	High
Finch West Option 2	Low
Finch West Option 3	Medium
Finch West Option 4	Medium
Finch West Option 5	Low
Steeles West Option 1A	Medium
Steeles West Option 1B	Medium
Steeles West Option 2	Medium
Steeles West Option 3	High

4.32 D 1.1A Area of natural heritage features (hectares)

4.32.2 Methodology

The natural heritage features identified include terrestrial and aquatic ecological landscapes, ecosystems/communities and populations/species. The analysis focused on natural heritage features located on-site**,** that is up to 30m wide right-of-way for each of the four South Alignments (including Sheppard West Station) and the three North Alignments (including York University Station); and within the footprint area to be occupied by the five Finch West Station concepts and the four Steeles West Station concepts. There were no waterbodies, watercourses or aquatic ecosystems located on-site.

4.32.3 Results

Using GIS software, an outline of each of the four South Alignments (including Sheppard West Station); the three North Alignments (including York University Station); the five Finch West Station concepts and the four Steeles West Station concepts was laid over a layer containing natural heritage features. The overlapping area of natural heritage features located on-site for each proposed subway alignment and station footprint was then traced and calculated in hectares, natural heritage features were also counted. The results of this analysis are presented in Table 33.

4.33 D 1.1B Type of natural heritage features (ELC classification)

4.33.1 Methodology

The type of natural heritage features found on-site was also documented and presented in Table 33.

4.34 D 1.1C Significance of natural heritage features (local, regional, provincial, federal)

4.34.1 Methodology

The natural heritage features identified within the subway alignments and station concepts were all considered to be of local significance based on Ecological Land Classification and federal, provincial, regional and local policy.

4.35 D 1.1D Resiliency of natural heritage features (low, medium, high)

4.35.1 Methodology

Two ecological elements were used to ascertain the level of resiliency of a natural heritage feature, namely:

- the type of natural heritage feature
- the features level of sensitivity to environmental disturbance/impacts

Features that were recently or continue to be disturbed by human activity were considered to have a high level of resiliency to disturbance. This included cultural vegetation within the study area such as meadows, thickets and woodlots. Natural deciduous forests and marshes were considered as to have a medium level of sensitivity to disturbance (resiliency). Other types of wetlands, such as swamps, bogs and fens, were considered to have a low level of resiliency, although none of these features were found in the study area.

4.32 to 35.2 Results

Table 33 provides the details results for Indicator D1.1 (Area, type, significance and resiliency of aquatic and terrestrial ecological landscapes, ecosystems/communities and populations/ species located within alignment and station footprints).

TABLE 33 – Natural Heritage Features – On Site

Alignment	Type of Natural Heritage Features	Total Area	Sensitivity/ Significance	Resiliency
S1 East & West	CUM1-1; *cultural meadow*	3.37, 2.86	Local	High
S2 East & West	CUM1-1; *cultural meadow*	2.04, 1.64	Local	High
S3 East & West	None	0	None	None
S4 East & West	None	0	None	None
N1	CUM1/CUT1 *cultural meadow*	1.65	Local	High
N2	CUM1-1/AGR; CUM1-1; FOD4; FOD6-5 *cultural meadow, deciduous forest*	1.65	Local	Medium
N3	CUM1-1/AGR; FOD4; FOD6-5; *cultural meadow, deciduous forest*	1.57	Local	Medium
Finch West Option 1	CUM1-1/CUM1-1/MAM2-2 *cultural meadow, meadow marsh*	2.51	Local	Medium
Finch West Option 2	CUM1-1/CUM1-1/MAM2-2 *cultural meadow, meadow marsh*	2.51	Local	Medium
Finch West Option 3	CUM1-1/CUM1-1/MAM2-2 *cultural meadow, meadow marsh*	2.51	Local	Medium
Finch West Option 4	CUM1-1/CUM1-1/MAM2-2 *cultural meadow, meadow marsh*	2.51	Local	Medium
Finch West	CUM1-1/AGR	2.51	Local	Medium

Alignment	Type of Natural Heritage Features	Total Area	Sensitivity/ Significance	Resiliency
Option 5	*cultural meadow, meadow marsh*			
Steeles West Option 1A	CUM1-1/AGR *cultural meadow*	14.78	Local	High
Steeles West Option 1B	CUM1-1/AGR *cultural meadow*	14.52	Local	High
Steeles West Option 2	CUM1-1/AGR/CUW1 *cultural meadow*	12.52	Local	High
Steeles West Option 3	CUM1-1/AGR *cultural meadow*	13.19	Local	High

4.36-39 D 1.2A Area of natural heritage features (hectares) located within adjacent zone of influence (100m).

4.36 to 39.1 Methodology

The same methodology used for Indicator D1.1 (above) was used for this indicator. However, this set of analysis focused on natural heritage features located off-site referring to areas located adjacent to the right-of-way of the subway alignment and station footprint up to a distance of 100m.

4.36 to 39.2 Results

Table 34 provides detailed results for Indicator D1.2 (Area, type, significance and resiliency of aquatic and terrestrial ecological landscapes, ecosystems/communities and populations/ species located in areas adjacent to the subway alignment and station footprint).

Table 34 – Natural Heritage Features – Off Site

Alignment	Type of Natural Heritage Features	Total Area	Sensitivity/ Significance	Resiliency
S1 East & West	CUM1-1/ CUM1-1; *cultural meadow*	19.48, 16.78	Local	High
S2 East & West	CUM1-1/ CUM1-1; *cultural meadow*	10.67, 8.32	Local	High
S3 East & West	CUM1-1/ CUM1-1; *cultural meadow*	2.55, 2.01	None	High
S4 East & West	None	None	None	None
N1	CUM1-1/AGR; CUM1-1; CUT1/CUW1; CUM1-1/MAM2-2; MAM2-2/MAS2-1/OAO; *cultural meadow, cultural thicket, cultural woodland, meadow marsh, shallow marsh, open aquatic*	13.85	Local	Medium
N2	CUM1-1/AGR; CUM1-1; CUM1-1/MAM2-2; MAM2-2/MAS2-1/OAO; FOD4; FOD6-5; *cultural meadow, meadow marsh, shallow marsh, deciduous forest, open aquatic*	15.92	Local	Medium
N3	CUM1-1/AGR; CUM1-1; CUM1-1/MAM2-2; MAM2-2/MAS2-1/OAO; FOD4; FOD6-5; *cultural meadow, meadow marsh, shallow marsh, deciduous forest, open aquatic*	15.54	Local	Medium

Alignment	Type of Natural Heritage Features	Total Area	Sensitivity/ Significance	Resiliency
Finch West Option 1	CUM1-1; CUM1-1/MAM2-2; *cultural meadow, meadow marsh*	3.93	Local	Medium
Finch West Option 2	CUM1-1; CUM1-1/MAM2-2; *cultural meadow, meadow marsh*	4.12	Local	Medium
Finch West Option 3	CUM1-1; CUM1-1/MAM2-2; *cultural meadow, meadow marsh*	4.12	Local	Medium
Finch West Option 4	CUM1-1; CUM1-1/MAM2-2; *cultural meadow, meadow marsh*	4.12	Local	Medium
Finch West Option 5	CUM1-1; CUM1-1/MAM2-2; *cultural meadow, meadow marsh*	4.12	Local	Medium
Steeles West Option 1A	CUM1-1/AGR; CUW1; *cultural meadow, meadow marsh*	9.2	Local	High
Steeles West Option 1B	CUM1-1/AGR; CUW1; *cultural meadow, meadow marsh*	8.57	Local	High
Steeles West Option 2	CUM1-1/AGR; CUW1; *cultural meadow, meadow marsh*	10.66	Local	High
Steeles West Option 3	CUM1-1/AGR; CUW1; *cultural meadow, meadow marsh*	10.23	Local	High

4.40 D 2.1A Area of groundwater recharge/discharge affected (ha).

4.40.1 Methodology

Geology/subsurface stratigraphy, hydrogeology data of the study area was used to determine the areas of groundwater discharge within the zone of influence of the subway extension. The area was calculated in hectares. The study team observed that almost all of the four South Alignments (including Sheppard West Station), the three North Alignments (including York University Station), the five Finch West Station concepts and the four Steeles West Station concepts were located partially within areas of groundwater discharged. Thus, the on-site and off-site areas were calculated in hectares as follows:

On site refers to areas located within 30 m wide right-of-way for each subway alignment and within station footprint areas; and,

Off-site refers to areas located adjacent to the right-of-way of each subway alignment and station footprints areas up to a distance of 100m.

4.40.2 Results

Using GIS software, an outline of all of the subway alignments and station concepts was laid over a layer of geology/subsurface stratigraphy and hydrogeological data. The total size of area of groundwater discharge within the zone of influence of the subway extension was determined by summing up all areas of groundwater discharge located within each proposed subway alignment and station footprint (Table 35).

4.41 D 2.1B Significance of groundwater recharge/discharge areas affected.

4.41.1 Methodology

Groundwater recharge/discharge areas located within the study area are associated with Black Creek and the West Don River. These groundwater recharge/discharge areas are considered to have local significance.

4.41.2 Results

The results of the analysis are presented in Table 35.

Table 35 - Ground Water Discharge Areas

Alignment	Total Area of Groundwater recharge/discharge	Significance of Groundwater recharge/discharge affected
S1 East & West	5.93, 4.83	Local
S2 East & West	2.96, 4.59	Local
S3 East & West	2.22, 3.9	Local
S4 East & West	1.2, 1.2	Local
N1	3.12	Local
N2	1.82	Local
N3	2.68	Local
Finch West Option 1	0	Local
Finch West Option 2	0	Local
Finch West Option 3	0.02	Local
Finch West Option 4	0	Local
Finch West Option 5	0.02	Local
Steeles West Option 1A	9.98	Local
Steeles West Option 1B	8.36	Local
Steeles West Option 2	8.52	Local
Steeles West Option 3	9.06	Local

4.42 D 2.1C Area of aquifers affected.

4.43 D 2.1D Significance of aquifers affected.

4.42 and 43.1 Methodology

Aquifers that are likely to be impacted during the construction phase of the subway extension are documented in Appendix D - Geotechnical Investigation Report prepared by Golder (Figures 3 to 6). As presented in Table 36, these aquifers are primarily localized and the project impacts are expected to be temporal/low to moderate, primarily during the construction phase of the project.

Table 36 – Aquifers located in Study Area

Alignment	Area of Aquifers affected	Significance of Aquifers affected
S1 East & West	Temporary/low to moderate	Local
S2 East & West	Temporary/low to moderate	Local
S3 East & West	Temporary/low to moderate	Local
S4 East & West	Temporary/low	Local
N1	Temporary/low	Local
N2	Temporary/low	Local
N3	Temporary/low	Local
Finch West Option 1	Temporary/low to moderate	Local
Finch West Option 2	Temporary/low to moderate	Local
Finch West Option 3	Temporary/low to moderate	Local
Finch West Option 4	Temporary/low to moderate	Local
Finch West Option 5	Temporary/low to moderate	Local
Steeles West Option 1A	Temporary/moderate	Local

Alignment	Area of Aquifers affected	Significance of Aquifers affected
Steeles West Option 1B	Temporary/moderate	Local
Steeles West Option 2	Temporary/moderate	Local
Steeles West Option 3	Temporary/moderate	Local

4.44 D 2.2A Area of soil to be disturbed.

4.45 D 2.2B Type of soil to be disturbed.

4.44 and 45.1 Methodology

Geology/subsurface stratigraphy, hydrogeology data of the study area was used to determine the potential for soil erosion within the zone of influence of the subway extension. The area was calculated in hectares. Consideration was given to on-site and off-site areas, where:

On site refers to soils located within 30 m wide right-of-way for each subway alignment and station footprint areas; and,

Off-site refers to soils located on lands adjacent to the right-of-way for each subway alignment and station footprint areas up to a distance of 100m.

4.44 and 45.2 Results

Using GIS software, an outline of each of the subway alignment and station concept was laid over a layer of geology/subsurface stratigraphy and hydrogeological data. The total area of soil to be disturbed within the zone of influence of the subway extension was determined by summing up all areas of soils to be disturbed for each proposed subway alignment and station concept.

4.45.1 Methodology

The type of soils located within these areas was also recorded.

Table 37 – Soils located in Study Area

Alignment	Type of Soils to be disturbed	Total Area of Soils to be disturbed
S1 East & West	Stone-poor, Carbonates (silty-sandy till)	8.79, 9.18
S2 East & West	Stone-poor, Carbonates (silty-sandy till)	9.26, 9.64
S3 East & West	Stone-poor, Carbonates (silty-sandy till)	8.87, 9.24
S4 East & West	Stone-poor, Carbonates (silty-sandy till)	8.06, 8.06
N1	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	8.4
N2	Stone-poor, Carbonates (silty-sandy till)	8.36
N3	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	7.98
Finch West Option 1	Stone-poor, Carbonates (silty-sandy till)	7.4
Finch West Option 2	Stone-poor, Carbonates (silty-sandy till)	6.5
Finch West Option 3	Stone-poor, Carbonates (silty-sandy till)	2.91
Finch West Option 4	Stone-poor, Carbonates (silty-sandy till)	3.96
Finch West Option 5	Stone-poor, Carbonates (silty-sandy till)	3.43
Steeles West Option 1A	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	16.46
Steeles West Option 1B	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	16.83

Alignment	Type of Soils to be disturbed	Total Area of Soils to be disturbed
Steeles West Option 2	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	13.58
Steeles West Option 3	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	13.41

4.46 D 3.1 Area of flood storage capacity removed (hectares).

The alternative subway alignments and station concepts are not located within floodplain areas; therefore, this factor was not used to evaluate alternatives.

4.47 D 3.2 Length/area of surface water features (meters/hectares).

The alternative subway alignments and station concepts are not located on or near any watercourses or waterbodies; therefore, this factor was not used to evaluate alternatives.

4.48 D 3.3 Opportunities consistent with City of Toronto WWFMMP

4.48.1 Methodology

All redevelopment presents an opportunity to retrofit the stormwater management of the area. Wherever redevelopment of the surface structures occurs, there is limited or no opportunity to provide quantity control of the runoff; but there is opportunity to provide quality treatment of runoff from affected areas by insertion of some oil/grit separation technology.

4.48.2 Results

- No further impacts are expected for the York University Station;
- In the case of Sheppard West Station concepts, S1 and S2 options occur in undeveloped (Downsview) land that may provide some opportunity for quantity control by way of surface storage within local swales. Land requirements are anticipated to be minimal. S3 and S4 do not present any such opportunities;
- With regards to the Finch West Station concepts, quality control will be required for the new parking and can be provided on site, either by use of parking lot storage, surface storage, subsurface storage or dry pond adjacent to the site. All options present equal opportunity; and,
- In the case of Steeles West Station concepts, quantity control will be required for the new parking and bus terminals, and can be provided on site, either by use of parking lot storage, subsurface storage or a dry pond adjacent to the site. Additionally, there is some potential to retrofit a City-owned pond in the vicinity to provide quality and quantity treatment elsewhere (pending research). Option 3 (Option 4) has a reduced impact on quantity control because of reduced increase of total hard surface (stacked terminal) and so is preferred from a SWM perspective.

4.49 D 4.1A Number of individual properties directly affected. /Number of sensitive buildings over or adjacent to the alignment. Number of employment facilities impacted.

4.49.1 Methodology

The alignments and the station concepts avoid sensitive land uses to the extent possible; however, some options have a greater impact on stable employment lands than others. The land use analysis and data collection process is based on the methodology used in section 4.27 to 4.29.

A field count was conducted to determine the number of individual properties directly impacted by alignments and station footprints and the number of buildings impacted along the South and North

Alignments, Finch and Steeles West station as well as on the York University Campus.

4.51 D 4.1C Number of Institutional facilities impacted

4.51.1 Methodology

The study team counted the number of institutional facilities that will be impacted. York University was considered as an entire institutional facility.

4.52 D 4.2A Area of stable residential lands within zone of influence (ha).

4.53 D 4.2B Area of stable employment within zone of influence (ha).

4.52 and 53.1 Methodology

The amount of area identified as stable residential within zone of influence was measured in hectares. The 500m zone of influence for stations and 100m zone of influence for alignment was used. Any area or land designated as stable residential (according to the City of Toronto designation) and located within the zone of influence was measured. The objective is to minimize impacts. It is not implied that the lands captured in this zone of influence were necessarily negatively affected; yet, the potential for impact was recognized and therefore the options that minimize the inclusion of stable land uses were generally preferred.

Similarly, the same idea was used for stable employment within zone of influence. The objective is to minimize the influences. Therefore, the area designated as stable employment area by the City of Toronto and were under the zone of influence were measured. The length of redevelopment frontage on York University lands was also assessed.

4.52 and 53.2 Results

Table 38 documents the summary of the field investigations according to the following:

- Number of individual employment/business properties affected/within alignment and station footprint,
- Amount of area identified as stable employment land within zone of influence
- Amount of area identified as stable residential within zone of influence.

Table 38 - Land Use – Employment, Sensitive and Residential Properties

Alignment	Number of Institutional Facilities within zone of influence	Number of individual sensitive buildings employment/ business properties affected	Amount of area identified as stable employment land within zone of influence (ha)	Amount of area identified as stable development on York University / residential land within zone of influence (ha)
S1 East & West	0	25, 19	12, 8	7, 10
S2 East & West	0	28, 20	19, 15	8, 10
S3 East & West	0	31, 38	27, 24	7, 8
S4 East & West	0	38, 38	36, 36	5, 5
N1	1	3	0.1	46
N2	1	1	6	40
N3	1	3	5	43
Finch West Option 1	0	23	*Due to the redevelopment*	*Due to the redevelopment potential and ownership*

Alignment	Number of Institutional Facilities within zone of influence	Number of individual sensitive buildings employment/ business properties affected	Amount of area identified as stable employment land within zone of influence (ha)	Amount of area identified as stable development on York University / residential land within zone of influence (ha)
Finch West Option 2	0	23	*potential and ownership structure, impact on stable lands is not considered relevant for these stations*	*structure, impact on stable lands is not considered relevant for these stations*
Finch West Option 3	0	3		
Finch West Option 4	0	3		
Finch West Option 5	0	5		
Steeles West Option 1A	1	2	*Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these stations*	*Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these stations*
Steeles West Option 1B	1	2		
Steeles West Option 2	0	2		
Steeles West Option 3	0	3		

4.50 D 4.1B Number of community/recreational facilities impacted.

4.51 D 4.1C Number of institutional facilities impacted

4.50 and 4.51.1 Methodology

The number of communities/recreational and institutional facilities that will be directly affected by the subway facilities was counted. The aim is to minimize the number of communities/recreational and institutional facilities impacted.

4.50 and 4.51.2 Results

There are no community/recreational facilities impacted and associated with the Finch West Station. Since the proposed station location for Steeles West Station is vacant, there are no community/recreational facilities impacted. There are no community/recreational facilities that are impacted in association with Sheppard West Station. The number of sensitive buildings over and adjacent to the alignments was counted as all the North Alignments pass through York University. The field investigations indicated that N1 will affect 3 buildings, N2 will affect 1 building and N3 will affect 3 buildings.

4.54 D 5.1A Number of Closures

4.55 D5.1B Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)

4.54 and 4.55.1 Methodology

This indicator applies only to the Steeles West Station concept. The only road closure required for the proposed station alternatives was the prohibition of general purpose traffic along the new east-west road since it would be designated for transit use only for the Steeles West Station Option 2 scenario.

4.54 and 4.55.2 Results

Given the proposed configuration of the bus station along the east-west road, it is expected that vehicular traffic associated with the passenger pick-up/drop-off and commuter parking lot would impede the ease of transit movements, as well as security and fare-paid zones at the new station.

4.56 5.2A Number of critical movements within vicinity of station

4.56.1 Methodology

The station alternatives were evaluated based on the number of critical intersections within the study area. A critical intersection is defined as an intersection with an overall intersection volume-to-capacity (v/c) ratio greater than 0.85. The v/c ratio is a measure of the proportion of the calculated intersection capacity that is utilized by the modeled traffic volumes.

Further, the station alternatives were also evaluated based on the number of critical movements. At signalized intersections, movements with a v/c ratio greater than 0.85 or an average vehicle delay greater than 55 seconds (Level of Service 'E') are defined as critical. At unsignalized intersections, movements with a v/c ratio greater than 0.85 or an average vehicle delay of greater than 35 seconds (Level of Service 'E') are defined as critical movements.

4.56.2 Results

Based on the results of traffic analyses for each station option, the number of critical movements for Finch West Station and Steeles West Station were summed. The results are presented in Table 39.

Table 39 - Number of Critical movements for Finch West and Steeles West Stations

Finch West Station Concepts					Steeles West Station			
Option 1	Option 2	Option 3	Option 4	Option 5	Option 1A	Option 1B	Option 2	Option 3
27	21	22	26	21	42	40	40	39

4.57 D 5.2B Sum of intersection delays (in sec's) at key intersections within study area.

4.57.1 Methodology

The station alternatives were evaluated based on the number of critical intersections within the study area. A critical intersection was defined and the volume-to-capacity (v/c) ratio greater than 0.85 was also measured as the proportion of the calculated intersection capacity that is utilized by the modeled traffic volumes. The sum of the intersection delays for theses critical intersections were measured in seconds, the results are presented in Table 40.

4.57.2 Results

The results are presented in Table 40.

Table 40 - Sum of Intersection Delays (in seconds)

Finch West Station					Steeles West Station			
Option 1	Option 2	Option 3	Option 4	Option 5	Option 1A	Option 1B	Option 2	Option 3
361	387	366	344	370	609	623	625	647

4.61 D 5.4 Impact on response times for EMS services.

4.61.1 Methodology

The station alternatives were evaluated using the sum of overall intersection delays. Based on the results of the traffic analysis, the overall intersection delays for all the intersections within the study area were calculated to provide a total delay for each station option. These delays have the potential to impact the response times for EMS services. Using the methodology of Indicator (4.57) D 5.2A, to define the critical intersection and the critical movements within these intersections, the study team calculated the impacts on response times for EMS services.

4.61.2 Results

Table 41 summarizes the impact on response times for each station concept at the Finch West Station and Steeles West Station; detailed calculations are presented in Appendix N - Traffic Report prepared by URS Canada.

Table 41 – Impacts on Response times of EMS services

Finch West Station Options						Steeles West Station Options			
Stations	Option 1	Option 2	Option 3	Option 4	Option 5	Option 1A	Option 1B	Option 3	Option 4
	6	7	6	6	6	9	9	9	10

4.58 D 5.2C Number of entrances/egresses obstructed by average peak hour queue lengths

4.58.1 Methodology

The average queue lengths were reviewed for any queues that may potentially obstruct the entrances associated with the stations. It should be noted that both the a.m. and p.m. peak hour average queue lengths were both reviewed for this exercise. In any case, when an average queue length exceeds the distance between an intersection and an upstream entrance along an arterial road, it is noted as an obstruction during that particular peak hour.

4.58.2 Results

Table 42 summarizes the number of entrances obstructed by peak hour average queue lengths for each station alternative at the Finch West Station and Steeles West Station. Detailed calculations can be found in the Traffic Impact Report Appendix G.

Table 42 - Number of Entrances Obstructed

Finch West Station					Steeles West Station			
Option 1	Option 2	Option 3	Option 4	Option 5	Option 1A	Option 1B	Option 2	Option 3
1	0	2	4	2	0	1	0	0

4.59 D 5.3A Number of new signalized conflict points (total change increase/ decrease) on the arterial network

4.60 D 5.3B Number of unsignalized conflict points (total change increase/decrease) on the arterial network.

4.59 & 4/60.1 Methodology

A conflict point is the point at which a road user crossing, merging with, or diverging from a road or entrance conflicts with another road-user making use the same road or entrance. It is any point where the paths of two

through or turning vehicles diverge, merge, or cross. Conflict points are commonly used to explain the collision potential of a roadway. The new entrances would potentially increase the rate of collisions along the arterial roads.

In this category, the number of conflict points was calculated based on the total number of conflict points contained in signalized and unsignalized intersections along the arterial road network within the study area for the proposed stations under future lane configurations.

4.59 & 4.60.2 Results

Table 43 summarizes the number of entrances obstructed by peak hour average queue lengths for each of the station alternatives at Finch West Station and Steeles West Station. Detailed calculations are in Appendix N - Traffic Report prepared by URS Canada.

Table 43 - Number of New Signalized/Unsignalized Conflict Points

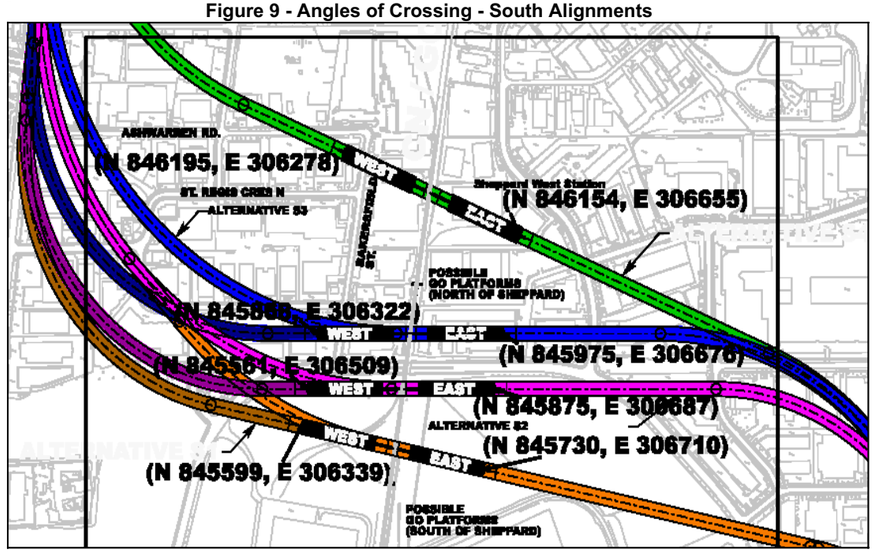
Total Change (increase/decrease)	Finch West Station					Steeles West Station			
	Option 1	Option 2	Option 3	Option 4	Option 5	Option 1A	Option 1B	Option 2	Option 3
Signalized	16	16	16	16	16	22	22	22	22
Unsignalized	-7	-9	-2	-2	-4	2	4	7	1

4.62 D 6.1 Angle of crossing at CN line (degrees)

4.62.1 Methodology

The angle at which the proposed subway alignment crosses the CN line was calculated by taking the difference between the alignment station and the south end of the intersection (Figure 9). The angles are presented in Table 44.

Figure 9 - Angles of Crossing - South Alignments



4.62.2 Results

Since York University Station and North Alignments do not cross CN rail line, this indicator does not apply to the North Alignments. Angles that were closer to 90 degrees were considered better options in terms of smooth operation of subway tracks.

Table 44 - Angle of Crossing – South Alignments

Angle of crossing								
Stations	**S1 West**	**S2 West**	**S3 West**	**S4 West**	**S1 East**	**S2 East**	**S3 East**	**S4 East**
Angle °	93	82	82	105	87	98	98	75

4.63 7.1A Number of archaeological sites.

4.63.2 Results

The preferred Route 1 (that was carried forward from appendix K into this stage of the EA) avoids all known archeological sites located within the study area and recorded in the Ontario Archaeological Sites Database.

4.64 D 7.1B Unlikeliness of the discovery of archeological remains.

The potential to discover archeological remains is low in all scenarios as there are no known archeological sites located within areas of ground disturbance for the Spadina Subway Extension. Details of the Archeological studies conducted for this project can be found in the EA document and Appendix G – Archeological Assessment Report prepared by Archeological Services Inc.

4.65 D7.1C Number of cultural heritage properties on municipal inventory or designated under the Ontario Heritage Act

4.66 7.1D Number of cultural heritage properties identified during a field review.

4.66.1 Methodology

Only the cultural heritage features identified under *Ontario Heritage Act* were included in the analysis. During the data collection process, consideration was given to features located directly on - site, where:

> On - site refers to areas located along 30m wide right-of-way of subway alignments and within the area occupied by subway facilities at station locations;

4.65 and 66.2 Results

Using GIS software, an outline of each of the proposed subway alignments and the footprint of the station concepts was laid over a layer containing cultural heritage features. The cultural heritage features located directly on site for each proposed subway alignment and station footprint was traced and counted (Table 45).

The Keele campus of York University was identified as a single cultural heritage landscape; it was also the only cultural heritage feature located in the study area. All three North alignments and four Steeles West station options pass through or are in close proximity to York University – Keele campus. Details of the cultural heritage studies undertaken for this project are presented in Appendix F - Built Heritage and Cultural Landscape Assessment Report prepared by Archeological Services Inc.

The study team embarked on additional field review to confirm the initial cultural heritage studies conducted earlier in the study, the results are presented in Table 45.

Table 45 – Cultural Heritage Features – On site

Alignment	Number of Cultural Heritage Features (*Ontario Heritage Act*)	Number of Cultural Heritage Features (identified during field review)
N1	1*(York University)*	1*(York University)*
N2	1*(York University)*	1*(York University)*
N3	1*(York University)*	1*(York University)*
Steeles West Option 1A	1*(York University)*	1*(York University)*
Steeles West Option 1B	1*(York University)*	1*(York University)*
Steeles West Option 2	1*(York University)*	1*(York University)*
Steeles West Option 3	1*(York University)*	1*(York University)*

4.67 D 7.2A Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act. (within adjacent zone of influence 100m)

4.68 D 7.2B Number of heritage properties identified during a field review.

4.67 and 68.1 Methodology

The focus of this analysis was on off-site cultural heritage features, where off-site refers to:

> lands adjacent to the right-of-way for each subway alignment and station footprint areas up to a distance of 100m.

Only cultural heritage features identified under *Ontario Heritage Act* were included in the analysis.

4.67 and 68.2 Results

Using GIS software, the off-site areas for both the proposed subway alignments and station footprints was laid over a layer containing cultural heritage features. The cultural heritage features were then traced and counted.

With the exception of the South alignments, all three North alignments, five Finch West and four Steeles West station options are in close proximity to York University which is recognized as a single built heritage unit (Table 46). The study team also embarked on additional field review to confirm the initial cultural heritage studies conducted earlier in the study.

Details of all cultural heritage studies located within the study area can be found in the stand alone Appendix F – Cultural Heritage Assessment Report.

Table 46 - Cultural Heritage Features – Off site

Alignment	Number of Cultural Heritage Features	Number of Cultural Heritage Features (identified during field review)
S1 East & West	0	0
S2 East & West	0	0
S3 East & West	0	0
S4 East & West	0	0
N1	1*(York University)*	1*(York University)*

Alignment	Number of Cultural Heritage Features	Number of Cultural Heritage Features (identified during field review)
N2	1*(York University)*	1*(York University)*
N3	1*(York University)*	1*(York University)*
Finch West Option 1	1*(York University)*	1*(York University)*
Finch West Option 2	1*(York University)*	1*(York University)*
Finch West Option 3	1*(York University)*	1*(York University)*
Finch West Option 4	1*(York University)*	1*(York University)*
Finch West Option 5	1*(York University)*	1*(York University)*
Steeles West Option 1A	1*(York University)*	1*(York University)*
Steeles West Option 1B	1*(York University)*	1*(York University)*
Steeles West Option 2	1*(York University)*	1*(York University)*
Steeles West Option 3	1*(York University)*	1*(York University)*

4.69 D 8.1A Number of pipeline crossing.

4.69.1 Methodology

This indicator applies exclusively to the North Alignments as the pipelines that are being referred to in this category are high pressured gas pipelines along the Finch Hydro Corridor.

4.69.2 Results

Through field investigations, the study team identified four pipelines located within the Finch hydro corridor and all the North alignments cross them as presented in Table 47.

Table 47 – Number of Pipeline Crossing

	North Alignments (Including York University Station)		
	N1	N2	N3
	Yellow	Purple	White
Number of pipeline crossing	4	4	4

4.70 D 8.1B Vertical separation (in meters) between pipelines and subway tunnel.

4.70.1 Methodology

As mentioned earlier, this indicator is only applicable to the North Alignments. The vertical separation between pipelines and the subway tunnel was measured by taking the distance between the top of the subway tunnel to the bottom of the pipelines, which are approximately 2 m below existing ground. It should be noted that as refinement continues on the Finch West Station, especially after the modification of the proposed alignment and depth, that the vertical distance may increase.

4.70.2 Results

Due to the proximity of the Finch West Station, the vertical separation between the pipelines and subway tunnel are all very close to each other, with a vertical separation of approximately 5.3 m.

4.71 E 1.1 Capital costs estimated in 2005 dollars after GST Rebate $ (millions).

4.71.1 Methodology

The capital costs were estimated using the information that was provided by TTC.

4.71.2 Results

Table 48 presents a summary of the capital cost per alignment and station concept.

Table 48 – Capital Cost Estimates in $ millions

Alignment/Station	Total Capital Cost Estimates $ millions
S1 East & West	507, 519
S2 East & West	514, 525
S3 East & West	508, 520
S4 East & West	484, 484
N1	458
N2	449
N3	460
Finch West Option 1	34
Finch West Option 2	34
Finch West Option 3	33
Finch West Option 4	34
Finch West Option 5	31
Steeles West Option 1A	121
Steeles West Option 1B	122
Steeles West Option 2	112
Steeles West Option 3	138

4.72 Estimated real estate costs in 2005 dollars.

4.72.1 Methodology

The real estate cost is the estimated cost of acquiring properties located within the areas proposed for the station concepts as well as compensatory costs. The study team has identified certain properties located along Sheppard Avenue, within the intersection of Keele Street and Finch Avenue West as well as and along Steeles Avenue that may be acquired.

4.72.2 Results

A summary of capital cost estimates are presented in Table 49. There are no estimated real estate costs for the North Alignments which passes within York University – Keele Campus because York University will provide the City of Toronto with property at no cost to the City.

Table 49 – Real Estate Cost Estimates in $ millions

Alignment/ Station	Total Estimated Real Estate Cost $ millions
S1 East & West	8.6, 7.6
S2 East & West	8.2, 7.7
S3 East & West	20.6, 14.6
S4 East & West	17.5, 15.3
N1	0

Alignment/ Station	Total Estimated Real Estate Cost $ millions
N2	0
N3	0
Finch West Option 1	24
Finch West Option 2	24
Finch West Option 3	24
Finch West Option 4	20
Finch West Option 5	24
Steeles West Option 1A	3.4
Steeles West Option 1B	4.2
Steeles West Option 2	0.6
Steeles West Option 3	1.7

4.73 E 2.2 Number of known or potential contaminated sites within zone of influence of subway extension.

4.73.1 Methodology

To identify the number of known or potential contaminated sites within the zone of influence of the subway extension, the study team conducted a preliminary screening exercise on properties located within the Study Area using the information in the EcoLog Environmental Risk Information Services (ERIS) Report for the "TCC Study Area". There were two main objectives for the preliminary screening study, namely:

- to ascertain whether or not there were properties with a high potential to contribute to environmental contamination
- to identify the level of environmental contamination of property based on the type of land use and duration of usage of the property.

The results of this preliminary screening study conducted by the study term are documented in Appendix D – Geotechnical Investigation Report prepared by Golder Associates Limited. In this report, a property was categorized as having a high potential to contribute to environmental contamination if that property has the following characteristics:

- has over 15 fifteen years use and storage of new and used hydrocarbon products and non-chlorinated solvents
- has over 15 fifteen years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)
- has bulk fuel handlings and storage facilities, primary business
- PCB storage site, reported PCB spills
- storage and use of new and used chlorinated solvents (non-laboratory use)

The study team created a list of properties/sites and corresponding addresses of properties/sites identified as having a high potential to contribute to environmental contamination along the proposed subway routes (according to the above highlighted classification).

A total of 36 properties/sites located within and adjacent to the study area were classified as having the potential to contribute to environmental contamination. Out of these 36 properties, the study team identified 25 properties/sites with potential to contribute to the environmental contamination located within and adjacent to Route 1.

The study team considered both properties/sites located directly on site and off site, where:

On site refers to areas located along a 30 m right-of-way for each subway alignment and within the area occupied by each station footprint; and,

Off-site refers to areas located adjacent to the right-of-way of each subway alignment and station footprint up to distance of 100 m.

4.73.2 Results

Using GIS software, an outline of each of the proposed subway alignments and station concepts was laid over a layer of properties/sites identified as having a high potential to contribute to environmental contamination. The properties/sites identified as having a high potential to contribute to environment contamination located both on site and off - site for each proposed subway alignment and station footprints was counted and the sum total calculated for each subway alignment and station location (Table 50).

Table 50 – Potential Contaminated Sites

Alignment/ Station	Number of known/potential Contaminated Sites
S1 East & West	6, 5
S2 East & West	10, 9
S3 East & West	9, 10
S4 East & West	6, 6
N1	3
N2	11
N3	11
Finch West Option 1	24
Finch West Option 2	24
Finch West Option 3	24
Finch West Option 4	20
Finch West Option 5	24
Steeles West Option 1A	2
Steeles West Option 1B	2
Steeles West Option 2	0
Steeles West Option 3	0

4.74 E 3.1 Total annual ridership on subway extension measured in number of riders. (Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.)

4.74.1 Methodology

Numbers and information for the total annual subway ridership was obtained from the City of Toronto Ridership Forecasts Report – Appendix

4.74.2 Results

Table 51 presents the total annual ridership forecasts.

Table 52 - Total Annual Ridership

Alignment/Station	Total Annual Ridership Numbers
S1 East	3050700
S1 West	3050700

Alignment/Station	Total Annual Ridership Numbers
S2 East	3050700
S2 West	3050700
S3 East	3050700
S3 West	3050700
S4 East	3050700
S4 West	3050700
N1	10290900
N2	10290900
N3	10290900
Finch West Option 1	3318000
Finch West Option 2	3318000
Finch West Option 3	3318000
Finch West Option 4	3318000
Finch West Option 5	3318000
Steeles West Option 1A	7929600
Steeles West Option 1B	7929600
Steeles West Option 2	7929600
Steeles West Option 3	7929600

4.75 E 3.2A Total length of track on curve (all radii).

4.75.1 Methodology

This indicator applies solely to the South and North Alignments. The length of curves of the subway alignment will affect the operations and maintenance cost of TTC.

4.75.2 Results

The results are presented in Table 52 and 53.

Table 52 – Total Length of Track Curve (m)

	South Routes (Including Sheppard West Station)							
	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East
	Orange		Pink		Blue		Green	
· Total length of track on curve (all radii).	1151	1490	1544	1931	1720	2106	1487	1487

Table 53 – Total Length of Track Curve (m)

	North Alignments (Including York University Station)		
	N1	N2	N3
	Yellow	Purple	White
· Total length of track on curve (all radii).	1988	1761	1313

4.76 E 3.2B Reduction (addition) to total route length for existing bus services in the study area.

4.76.1 Methodology

This indicator was an approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is

calculated by the difference between the time saved and increase of service on some routes (26 Finch West, 60 Steeles West, 35 Jane, 108 Downsview).

4.76.2 Results

Total bus hours saved per week is 1411 hours. Total bus kilometers saved each week is 32600 km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.

4.77 E 3.2C Contains project elements with higher operating & maintenance needs.

4.77.1 Methodology

The purpose of this indicator is to identify differences in the cost of operating and maintaining stations facilities based on the size and configuration of the station concept being proposed.

4.77.2 Results

None of the station options for Sheppard West, York University and Finch West contain project elements with higher operating and maintenance needs as the proposed station concepts are similar. They are all single level bus terminals which are of the same size and configuration.
Steeles West Option 3 is the only exception. This station is expected to have a significant operating and maintenance cost due to the fact that a stacked bus terminal concept has been proposed. The estimates are drawn from previous experiences of TTC including the similar bus terminals at the Victoria Park, Warden and Wilson Stations.

Conclusions

Appendices 1 to 4 of this report present the data analyzed for each of the eight South (east and west) and three North alignments as well as the five Finch West Station concepts and the four Steeles West Stations concepts. This data was used in the MATS and RAM evaluations.

5.0 Results of Reasoned Argument Method

This section describes the RAM weighting process as well as the results for RAM analysis (overall scores) conducted for each alternative subway route and station concepts.

5.1 RAM Weights

As discussed in chapter 3, the RAM analysis is based on the rules of logic. The differences between the net effects associated with the various subway alignment and station concepts are the essential components of this methodology. Symbols were used to identify the advantages and disadvantages of each objective and alignment and station concept. The higher an alignment or station concept performs on an objective is an indication of its relative significance. The symbols used to determine preferences are described below: In addition, the relative importance of each indicator was identified by assigning a size to the symbol:

● A fully shaded circle implies the most preferred;

◕ A three/quarter shaded circle implies higher than average preference;

◑ A half shaded circle implies an average preference;

◔ A quarter shaded circle implies a lower than average preference; and,

○ A circle that is not shaded at all implies the least preferred.

● **Low Importance;**

● **Moderate Importance; and,**

● **High Importance.**

Weights were placed on the five objectives and subdivided among corresponding criteria based on their potential to differentiate the alignments and station concepts. The weights play an important role in circumstances where indicators with high importance are the key deciding factors used to determine the best option. In cases where two options have equal importance, the deciding factor is often based on the moderate importance criteria. If there are no moderately important criteria, then the low importance factor or any valid reasoning will be used.

Tables 54– 57 present the weights (highlighted) assigned to each indicators for the RAM analysis.

Table 54 - RAM Weights - Evaluations for South Alignments

Criteria	Indicators	Comments	Weighting	RAM Symbol
A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	All routes (Sheppard West Station) location are below minimum density levels	LOW	●
	A1.2) Future population and employment within 500 m walking distance of subway stations.	All routes (Sheppard West Station) location are below minimum density levels	LOW	●
A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments does not vary enough to generate a perceptible difference in travel time for transit riders.	NO	
	A2.2) Speed and comfort for subway passengers.	Radii in this range may affect neither travel time nor passenger comfort.	NO	
B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Recognizing the low transfer volume, the centre of platform to centre of platform distance is not critical for loading.	NO	
B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.3) Quality of walking environment from other travel modes to subway platform.	Direct connections to Sheppard Avenue may influence the actual walk on numbers.	MEDIUM/HIGH	●
C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Route 1 was selected to capture development potential on Downsview lands (south of Sheppard).	HIGH	●
C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Current low densities and short term ridership demands will require special surveillance needs for this station.	LOW	●
D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Natural environment is limited to open lands on Downsview, which are not considered significant.	LOW	●
	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Natural environment is limited to open lands on Downsview, which are not considered significant.	NO	
D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Proximity to local aquifer along west limit of Keele Street is locally significant and can be mitigated during construction	NO	
	D2.2) Potential for soil erosion.	Area of soil to be disturbed is essentially the same for each option.	NO	

Criteria	Indicators	Comments	Weighting	RAM Symbol
D3) Potential effects on hydrology.	D3.3) Ease and effectiveness of stormwater management at subway facilities.	Surface footprint of Sheppard West station limits the impact to stormwater	LOW	●
D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Protection of stable Keele Industrial Area is a priority for the City of Toronto.	HIGH	●
	D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Protection of stable Keele Industrial Area is a priority for the City of Toronto.	HIGH	●
D6) Effects on freight and rail passenger service and its signal systems at the GO/Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	All alignments use minor deflections from 90 degrees. Impacts can be mitigated through detailed design.	LOW	●
E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	All options are within 10%. However, difference between low and high is $41 m	MEDIUM/HIGH	●
E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Difference between low and high is $13 m	MEDIUM	●
	E2.2) Potential environmental cleanup costs.	Potential impact of contaminated sites can be mitigated through choice of construction methodology.	LOW/MEDIUM	●
E3) Minimize the net operating cost.	E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Track maintenance is a perpetual cost which should be minimized if possible.	MEDIUM	●

Table 55 - RAM Weights - Evaluations for North Alignments

Criteria	Indicator	Comments	Weighting	RAM Symbol
A1) Potential for riders to walk to local stations.	A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance is essentially the same. All can be considered to provide equal service.	NO	
A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments is essentially the same and difference in travel time is imperceptible to transit rider.	NO	

Criteria	Indicator	Comments	Weighting	RAM Symbol
	A2.2) Speed and comfort for subway passengers.	Radii in this range may affect neither travel time nor passenger comfort.	NO	
B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	This is a long term initiative that should be protected for if possible.	LOW	●
B3) Flexibility for potential future subway extension into York Region.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Black Creek Pioneer Village is an important local heritage feature. Noise and vibration mitigating features can be employed during design to avoid this potential impact. Similarly, refinements to the alignment can minimize impacts to the cemetery.	LOW	●
	B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Radii in this range may affect neither travel time nor passenger comfort.	NO	
C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Development opportunities on both sides of Steeles are considered very important for both the City of Toronto and the City of Vaughan/Region of York	HIGH	●
D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Impacts to the natural environment can be mitigated through the selection of construction methodology. The differences between each alignment are not considered significant	LOW	●
	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Area of natural heritage features can be considered essentially the same for each option.	NO	
D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge /discharge affected are similar and can be mitigated during construction.	NO	
	D2.2) Potential for soil erosion.	Area of soil to be disturbed can be considered essentially the same.	NO	
D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Buildings at York University have already considered the subway (e.g. Accolade) or are sufficiently removed from the zone of influence.	LOW	●
E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Alignments are within 2%. However, the difference is $11 m.	LOW	●
E2) Minimize the costs of property acquisition.	E2.2) Potential environmental cleanup costs.	Impacts from potential contaminated sites within zone of influence of subway extension can be mitigated during construction.	LOW	●

Criteria	Indicator	Comments	Weighting	RAM Symbol
E3) Minimize the net operating cost.	E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Track maintenance is a perpetual cost which should be minimized if possible	MEDIUM	●

Table 56 - RAM Weights - Evaluations for Finch West Station Concepts

Criteria	Indicators	Comments	Weighting	RAM Symbol
B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus to subway platform at Finch West Station.	Convenient transfer between bus and subway is an important consideration. Opportunities to reduce this transfer time (I.e. final subway platform location) may result in similar operations for each of the station concepts.	LOW	●
	B1.3) Delay time for through passengers on the 36-Finch West bus route Finch West Station.	Moving buses into and out of the station is critical for passengers destined to the subway or continuing along the Finch West route. Finch is more significant route (versus Keele).	HIGH	●
	B1.3) Delay time for through passengers on the 41-Keele bus route at Finch West Station.	Moving buses into and out of the station is critical for passengers destined to the subway or continuing along the Finch West route. Finch is more significant route (versus Keele).	MEDIUM	●
B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/ non-ambulatory disabled persons).	B2.3) Quality of walking environment from other travel modes to subway platform.	Final locations for pedestrian entrances are dependent on subway platform location. Walk time can be considered essentially the same for each option.	NO	
C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Ability to encourage redevelopment at Keele and Finch is strategically important to the City of Toronto	HIGH	●
C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	High degree of conflicts between buses and pedestrians impacts safety and efficiency of the system. However, with the introduction of the subway, including pedestrian entrances, the existing pedestrian patterns may change in the immediate area. Furthermore, design considerations can mitigate some of these conflicts	LOW	●

Criteria	Indicators	Comments	Weighting	RAM Symbol
D1) Potential effects on natural heritage features.	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Area of natural heritage features are considered essentially the same for each option.	NO	
D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area impacted by options can be considered negligible and can be mitigated during construction.	NO	
	D2.2) Potential for soil erosion.	Soil is very low in sensitivity and can be mitigated during construction.	NO	
D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/ recreational/ institutional facilities located within alignment and station footprint areas.	The Keele / Finch node is considered an area for redevelopment. Retail that may be impacted may reappear as ground floor uses.	LOW	●
D5) Potential effects on pedestrian and traffic access/ flow.	D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station can be considered essentially the same for each option.	NO	
		Blocked driveways can affect TTC's bus operations during peak hours. It is during these periods that speed and reliability are most critical.	HIGH	●
	D5.3) Impact on safety of transportation system.	Number of unsignalized conflict points impacted can be considered insignificant.	NO	
	D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services is essentially the same for each option.	NO	
D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	With no known sites and the extensive disturbance at site location, all options can be considered essentially the same.	NO	
E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs for each station option are essentially the same.	NO	
E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	There is significant variation in property cost between each station concept.	HIGH	●
		Number of known or potential contaminated is essentially the same for each option.	NO	

Table 57 - RAM Weights - Evaluations for Steeles West Station Concepts

Criteria	Indicators	Comments	Weighting	RAM Symbols
B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus to subway platform at Steeles West Station.	Convenient transfer between bus and subway is an important consideration. Opportunities to reduce this transfer time (I.e. final subway platform location) may result in equal operations for each of the station concepts.	LOW	●
B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.2) Transfer time from other travel modes to subway platform.	Final configuration and location for PPUDO can be changed for each station.	NO	
		The ability to provide convenient connections to commuter parking is a function of the platform location (flexible), the lot location (hydro corridor) and the size of the lot.	NO	
	B2.3) Quality of walking environment from other travel modes to subway platform.	Passenger comfort is important for the attractiveness of transit.	HIGH	●
C1) Maximize redevelopment potential in support of the subway extension.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Ability to modify station to reflect changing bus demands	HIGH	●
	C1.1) Ability to combine stations with the existing and future built form.	Development opportunities on both sides of Steeles are considered very important for both the City of Toronto and the City of Vaughan/Region of York	HIGH	●
C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Not a reliable measure for the Steeles West Station location due to low existing pedestrian levels in the area.	NO	
		The ability to enhance passenger safety through station design selection is an important consideration.	MEDIUM	●
D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	The impacts are limited cultural meadows and the areas are essentially the same for each station.	NO	

Criteria	Indicators	Comments	Weighting	RAM Symbols
	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	The impacts are limited cultural meadows and the areas are essentially the same for each station.	NO	
D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected is essentially the same for each station concept. Impacts can be further mitigated during construction.	NO	
	D2.2) Potential for soil erosion.	Area of soil to be disturbed does vary but impacts can be mitigated during construction.	NO	
D3) Potential effects on hydrology.	D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP are available. An approach that is consistent with City policy can be developed regardless of option selected.	NO	
D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Although the impacts of each option varies, all employment and institutional properties in question are undeveloped/underdeveloped.	NO	
D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	The ability to provide an E-W road for general purpose traffic is important to the development of the north side of Steeles Avenue	HIGH	●
	D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Access/egress arrangements for each station alternative results in similar effects. Refinements to each option can achieve additional mitigation.	NO	
	D5.3) Impact on safety of transportation system.	Driveway locations and bus access/egress arrangements can be adjusted to mitigate this issue.	LOW	●
	D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact to EMS response times are essentially the same for each option.	NO	
E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	All options are within 10%. However, difference between low and high is $26 m	HIGH	●
E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Although there is a $3.6m difference between the lowest and highest, property costs can be considered low for each station.	LOW	●

5.2 RAM Analysis and Results

The study team conducted RAM evaluations based on these weights. A summary of the RAM evaluations and results are presented in the following sections; details the RAM analyses are provided in Appendices 5 to 8.

5.2.1 RAM Analysis for South Alignments

The RAM analysis for the south alignments is presented in Table 58.

Table 58 – RAM analysis for South Alignments

Indicators	Measures	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East
A1.1) Existing population and employment within 500 m walking distance of subway stations.	·Number of people and employees within 500 m radius of main entrance (Population per Hectare)								
A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)								
B1.1) Transfer time from bus to subway platform	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from WB on street bus bay to centre of subway platform.(Min.)								
B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)								
C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within station zone of influence (ha)								
	Amount of redevelopment within station zone of influence								
	Amount of redevelopment frontage encumbered by transit facilities (m)								
C2.1) Potential to create a safe environment for	Active Surveillance (low, medium, high)								

Indicators	Measures	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East
pedestrians, cyclists and transit passengers.									
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)								
	Resiliency of natural heritage features (low, medium, high)								
D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Number of individual properties directly impacted. Minimize								
D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Amount of area identified as stable employment within zone of influence (ha)								
	Amount of area identified as stable residential within zone of influence (ha)								
D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)								
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)								

Indicators	Measures	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	●	●	●	●	◕	◔	◕	◑
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	●	●	◕	◕	◕	◕	●	●
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	●	◕	◕	◑	◑	◑	◕	◕

5.2.2 RAM Results for South Alignments

The results for the RAM analysis indicate that South 2 West is the preferred alignment because it offers:

- a low potential impact to the Keele Industrial Area;
- the potential to encourage transit supportive development within and along the Park Downsview lands and adjacent street frontages; and,
- a convenient transfer from the GO Bradford Line to the TTC Spadina Subway and the Sheppard West Bus (84)

A summary of the RAM results is presented in Table 59.

Table 59 – Summary of RAM Results for South Alignments

Objectives	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East	Comments
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	◑	◑	◕	◕	◕	◕	●	●	• Stations within developed area (S4) have marginally higher walk in opportunity from Keele Industrial Area versus stations in undeveloped Downsview lands (S1). However, existing population and employment within walking distance for all station locations is lower than typically required for a subway station.
B) Provide improved connections between the TTC subway and GO	◑	◔	●	●	◕	◕	○	○	• All alignments provide a connection to the GO Bradford Line. • Stations close to Sheppard Avenue (S2 and S3)

Objectives	S1 West	S1 East	S2 West	S2 East	S3 West	S3 East	S4 West	S4 East	Comments
Transit, York Region Transit and TTC buses.									provide a possible connection from the subway and GO stations to the 84 - Sheppard West bus.
C) Support local population and employment growth.	●	◕	◕	◑	◑	◔	○	○	• Opportunities for development on the Downsview Park lands are greater to the west of the GO line, where the airport clearance envelope is less restrictive. Therefore, western station locations are more preferred. • Station locations set back from Sheppard provide more flexibility for development.
D) Minimize adverse environmental effects.	●	●	◕	◕	◑	◔	○	○	• S1 and S2 use undeveloped Downsview Park lands and Keele Street right of way to minimize impacts to existing businesses. • S3 and S4 affect more properties within the Keele Industrial Area.
E) Achieve reasonable capital and operating costs.	◕	◕	◑	◑	◑	◔	●	◕	• Differences for each alignment relate to length of the alignment (construction cost) and property costs. The cost estimates for alternatives is within a 10% range.
OVERALL	2	4	1	3	4	5	6	7	Option S2 West is preferred because it offers: • A low potential impact to the Keele Industrial Area. •The opportunity to encourage transit supportive development in the area (on the Downsview lands). • A convenient transfer from the GO Bradford line to the TTC Spadina Subway and the 84 - Sheppard West bus.

5.2.3 RAM Analysis for North Alignment

The RAM analysis for the north alignments is presented in Table 60.

Table 60 – RAM Analysis for North Alignments

Indicators	Measures	N1	N2	N3
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Area of groundwater discharge.(ha) [100m zone of influence]	◕	●	●
	Number of residences, businesses and community/recreational/ institutional facilities.	◕	●	●
	Number of cultural heritage features. [100m zone of influence]	◕	●	●
	Compatibility with planned land use.	●	●	●
C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within station zone of influence	●	●	●
	Amount of redevelopment frontage within station zone of influence (ha)	●	●	●
	Amount of redevelopable frontage encumbered by transit facilities (meters)	●	◕	◕
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/ communities and populations/ species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	◕	◕	●
	Resiliency of natural heritage features (low, medium, high)	●	◕	◕
D4.1) Number of employment properties and community/ recreational/institutional facilities located within alignment and station footprint areas.	Number of sensitive buildings over or adjacent to the alignment.	●	◕	●
	Area of stable employment within zone of influence (ha)	●	◕	◕

Indicators	Measures	N1	N2	N3
	Area of stable development on the York University Campus within the zone of influence (ha)	◑	●	◕
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	◕	●	◑
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	●	◕	◕
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	◑	◕	●

5.2.4 RAM Results for North Alignments

The results of the RAM analysis indicate that option North 3 Alignment is the preferred north subway alignment and York University Station concept because it offers the advantages described as follows:

- the best connection to the York University Common which is the transportation hub of the Keele Campus;
- the shortest length (track/alignment) from Finch West Station to Steeles West Station;
- the lowest operating and maintenance costs; and,
- the fewest impacts to the environment for this extension and any future extension of the Spadina Subway into the York Region.

A summary of the RAM results is presented in Table 61.

Table 61 – Summary of RAM Results for North Alignments

Objectives	Option N1 (Yellow)	Option N2 (Purple)	Option N3 (White)	Comments
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	●	◕	●	• The York University station for alternatives N1 and N3 will be in the Common, the transportation hub of the University. • Option N2 connects to the back of York Lanes and therefore is less preferred.
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	◕	●	●	• N1 would have the highest impacts to the socio-economic and natural environment if the subway were to be extended north into York Region.
C) Support local population and employment growth.	●	◕	◕	• Option N1 impacts the least amount of developable frontage along Steeles Avenue.

Objectives	Option N1	Option N2	Option N3	Comments
D) Minimize adverse environmental effects.	◕	◕	●	• Overall, the impacts to the campus are negligible for all three alignments. Minor differences include: • N1 is adjacent to more sensitive buildings (versus N2 and N3). • N2 is below more wooded area (versus N1 and N3).
E) Achieve reasonable capital and operating costs.	◑	◕	●	• Although there are differences in costs for each alignment, all alternatives are within a 3% range. • With the greatest number of curves and the longest alignment, N1 is least preferred. • With the fewest number of curves and the shortest alignment length, N3 is most preferred.
OVERALL	2	2	1	Option N3 is preferred because it offers: • The best connection to the York University Common, the transportation hub of the campus. • The shortest length from Finch West station to Steeles West station. • The lowest operating and maintenance cost. • The fewest impacts to the environment for this extension AND any future extensions into York Region.

5.2.5 RAM Analysis for Finch West Station Concepts

The RAM analysis for the Finch West Station concepts is presented in Table 62.

Table 62 – RAM Analysis for Finch West Station

Indicators	Measures	Option 1	Option 2	Option 3	Option 4	Option 5
B1.1) Transfer time from bus platform to subway platform	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	◑	◑	●	●	◕
B1.3a) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	●	●	◕	●	●
B1.3b) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	◕	◑	◕	◑	●

Indicators	Measures	Option 1	Option 2	Option 3	Option 4	Option 5
B1.4) Transfer from subway to future LRT in hydro corridor at Finch West Station.	Potential to provide a connection from subway platform to LRT in Hydro corridor/new LRT terminal.	●	●	◑	◑	◕
C1.1) Ability to combine stations with the existing and future built form.	Amount of redevelopment Frontage encumbered by transit facilities. Minimize.	◕	●	◑	◑	●
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	●	●	◑	○	●
	Active Surveillance (low, medium, high)	●	◑	◕	◕	◑
D4.1) Number of employment properties and community/ recreational/ institutional facilities located within alignment and station footprint areas.	Number of businesses directly impacted	◑	◔	●	●	◕
D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of entrances/egresses obstructed by average peak hour queue lengths	◕	●	◑	○	◑
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	◑	◑	◕	●	◕

5.2.6 RAM Results for Finch West Station Concepts

The results of the RAM analysis indicate that the Finch West Station Option 5 is preferred because it offers:

- a quick transfer time for passengers on both the Finch West Bus (36) and the Keele Street Bus (41) routes;
- the most developable frontage along both Keele Street and Finch Avenue West;
- the fewest impacts to existing business within the station area which will translate into lower capital and construction costs (property); and,
- the lease amount of disruptions to existing traffic within the station area.

A summary of the RAM results is presented in Table 63

Table 63 - Summary of RAM Results for Finch West Station Concepts

Objectives	Option 1	Option 2	Option 3	Option 4	Option 5	Comments
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	●	●	●	●	●	• Existing population and employment within walking distance of the Finch West Station is the same for all station concepts. • All options serve the Keele Street / Finch Avenue area.
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	◕	◑	◔	◑	●	• A bus terminals close to Keele and Finch (e.g. Options 3 and 4) will be impacted by the traffic in the Finch/Keele intersection resulting in long delays for buses. • Access away from this intersection from Keele Street (Option 1) or Tangiers Road (Option 2) or both (Option 5) is more preferred.
C) Support local population and employment growth.	◕	●	◑	◔	●	• A bus terminal set back from Finch and Keele provides better opportunities for transit-oriented development: • Locating the bus terminal on the corner of Finch and Keele (Options 3 and 4) limits development opportunities. • Locating the bus terminal along the frontage of Keele (Options 1, 3 and 4) limits development opportunities.
D) Minimize adverse environmental effects.	◔	○	●	◕	◑	• The north east quadrant of Keele and Finch has the highest number of businesses. Options 1 and 2 impact this area. • Existing frontage along Keele Street has the fewest number of businesses directly impacted (Options 3 and 4).
E) Achieve reasonable capital and operating costs.	◑	◑	◕	●	◕	• High property value for the multi-unit development on northeast corner of Finch and Keele (impacted by Options 1 and 2).
OVERALL	3	4	2	2	1	Option 5 is preferred because it offers: • A quick transfer time to subway for passengers on the 36 – Finch West bus route and the 41 – Keele bus route. • The most developable frontage along Keele Street and Finch Avenue West. • The fewest impacts to existing businesses / lower property cost. •The least amount of disruptions to existing traffic.

5.2.7 RAM Analysis for Steeles West Station Concepts

The RAM analysis for the Steeles West Station concepts is presented in Table 64.

Table 64 - RAM Analysis for Steeles West Station

Indicators	Measures	Option 1A	Option 1B	Option 2	Option 3
B1.1) Transfer time from bus to subway platform at Steeles West Station and Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	●	●	◑	◕
B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (Yes/No)	●	●	◕	●
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Ability to modify station to reflect changing bus demands	●	●	◕	◑
C1.1) Ability to combine stations with the existing and future built form.	Developable frontage encumbered by station amenities - length of Right of Way (meters)	◕	◕	●	●
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Active Surveillance (low, medium, high)	◕	◕	●	●
D5.1) Number of permanent road closures or access modifications.	Number of closures	●	●	◕	●
D5.3) Impact on safety of transportation system.	Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	●	◕	◑	●
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	◕	◕	●	◑
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	◔	○	●	◕

Indicators	Measures	Option 1A	Option 1B	Option 2	Option 3
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Contains project elements with higher operating & maintenance needs.	●	●	●	◕

5.2.8 RAM Results for Steeles West Station Concepts

The results of the RAM analysis indicate that the Steeles West Station Option 1A is the preferred station concept because it offers the following advantages:

- the quickest transfer time from the bus terminals to station platforms;
- the greatest flexibility to address changing bus service demands;
- lowest capital, operating and maintenance costs; and,
- ability to provide a good quality of waiting environment for bus passengers.

A summary of the results of the RAM analysis is presented in Table 65.

Table 65 - RAM Results for Steeles West Station

Objectives	Option 1A	Option 1B	Option 2	Option 3	Comments
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	●	●	●	●	• Existing population and employment within walking distance is the same for all station concepts. • All options serve York University and provide an inter-regional transit terminal for TTC, GO buses, York Transit and VIVA.
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	●	●	◑	◕	• Option 2 has the longest transfer time from bus to subway. • Limited ability to provide weather protected waiting area within the Hydro Corridor (Option 2). • Limited ability for Option 3 to adjust to reflect changing bus routes and service levels.
C) Support local population and employment growth.	◕	◕	●	●	• Options 1A and 1B encumber more frontage along Steeles Avenue that could be used for development.
D) Minimize adverse environmental effects.	●	◕	◑	●	• Option 2 may require part of the proposed East-West road (north of Steeles) to be transit only. • The driveway locations for the bus terminals for Options 1A and 3 support more efficient and safer movement of buses and traffic on the surrounding roads.
E) Achieve reasonable capital and operating costs.	◕	◕	●	◑	• Significant capital cost to construct a stacked bus terminal (Option 3). • Significant operating and maintenance costs for a stacked bus terminal (Option 3).

Objectives	Option 1A	Option 1B	Option 2	Option 3	Comments
					• Increased property cost with options 1A and 1B.
OVERALL	1	2	3	2	Option 1A is preferred because it offers: • The quickest transfer time from bus to subway platform. • The greatest flexibility to address changing bus service demands. • The lowest capital, operating and maintenance costs. • A quality waiting environment for bus passengers.

6.0 Results of MATS Analysis

This section describes the results of the MATS analysis including the overall scores of each alternative subway route and station concepts and how specific weights were assigned to each indicator/factor during each MATS analysis/sensitivity tests.

The study team adopted the same two approaches for assigning weights used at the routes stage (Appendix K) to ensure consistency in the project evaluation process; they are the "indicator - level" and "objective - level" weighting approaches.

The primary sets of MATS analyses conducted by the study team and overall scores were based on indicator - level weights. The remaining sets of MATS analyses conducted by the study team were based on objective - level weights.

6.1 Indicator - Level Weights

Considering the substantially large number of indicators (77) employed at this level of the evaluation process, the indicator – levels weights provided the study team with an opportunity to capture indicators with high potential to influence the evaluation process.

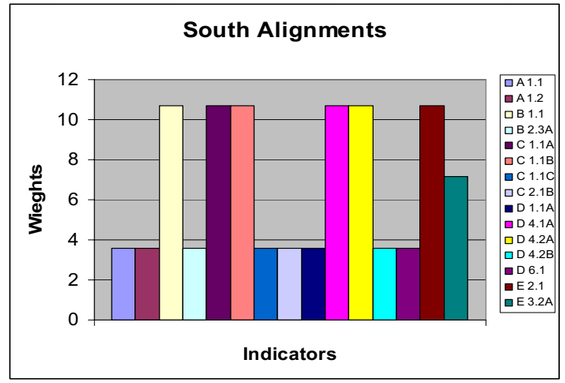
It is important to note that the 77 indicators considered were the total indicators developed for the entire evaluation process (applicable to the eight South alignments, three North alignments, the five Finch Station concepts and the four Steeles West stations concepts). Some of indicators were exclusive to stations concepts and others to subway alignments as highlighted in Appendices 1 to 4.

After thorough deliberations, the study team identified and selected specific indicators that were deemed as applicable and key decision-making indicators, and such indicators were used for each MATS analyses. Weights were assigned to these key decision-making indicators after these indicators had been reviewed and approved by the Technical Advisory Committee (TAC) of the project.

For the South Alignments, the study team placed emphasis on 15 key indicators as presented in Figure 10. Out of these 15 key indicators, the study team placed the most emphasis on 6 indicators (and assigned the highest weights) including:

- Indicator B1.1 Transfer time from bus to station platform (walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from WB on street bus bay to centre of subway);
- Indicator C 1.1A Ability to combine stations with existing and future built form (amount of area identified as redevelopment within station zone of influence);
- Indicator C 1.1B Ability to combine stations with existing and future built form (amount of redevelopment within station zone of influence);
- Indicator D 4.1 A Number individual properties directly impacted;
- Indicator D 4.2 A Amount of area identified as stable employment within zone of influence; and
- Indicator D E.2 A Total property cost.

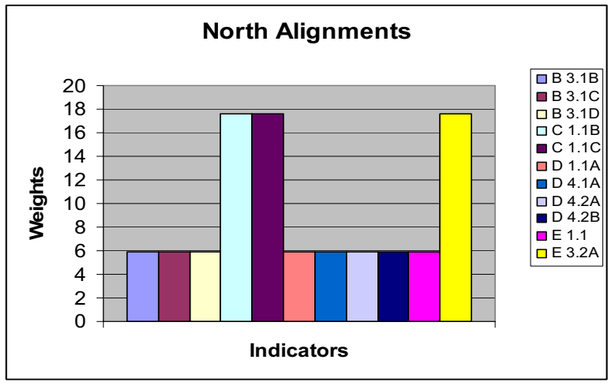
Figure 10 - Weights for South Alignments MATS Analysis



For the North Alignments, emphasis was placed on 11 key indicators as presented in Figure 11. Out of these 14 key indicators, the study team placed the most emphasis on 3 indicators (and assigned the highest weights) including;

- Indicator C 1.1 B Ability to combine stations with existing and future built form (amount of redevelopment frontage within station zone of influence);
- Indicator C 1.1 D Ability to combine stations with existing and future built form (amount of redevelopment frontage encumbered by transit facility); and
- Indicator E 3.2 A Total length of track on curve.

Figure 11 - Weights for North Alignments MATS Analysis

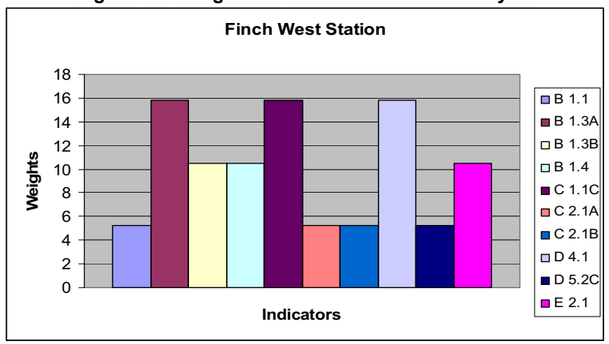


For the Finch West Station Options, emphasis was placed on 10 key indicators as presented in Figure 12. Out of these 10 key indicators, the study team placed the most emphasis on 3 indicators (and assigned the highest weights) including:

- Indicator B1.3A Delay time for through passengers on 36 Finch West Bus;

- Indicator C 1.1C Ability to combine stations with existing and future built form (amount of area identified as redevelopment within station zone of influence);
- Indicator D 4.1 A Number individual properties directly impacted;

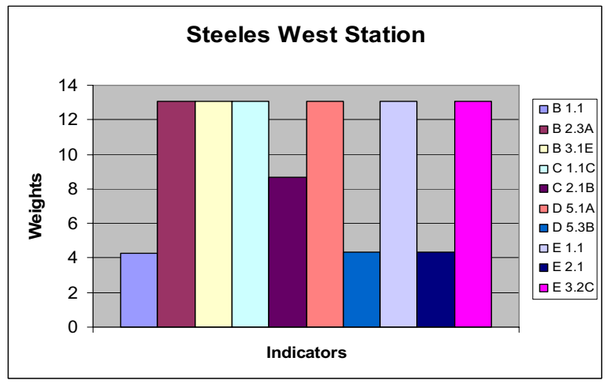
Figure 12 - Weights for Finch West MATS Analysis



For the Steeles West Station analysis, emphasis was placed on 10 key indicators as presented in Figure 13. Out of these 10 key indicators, the study team placed the most emphasis on 6 indicators (and assigned the highest weights) including:

- Indicator B 2.3 A Quality of walking environment from other travel modes (weather protected);
- Indicator B 3.1 E Ability to modify station to reflect changing bus demands;
- Indicator C 1.1 C Ability to combine station with existing and future built form (amount of redevelopment frontage encumbered by transit facility);
- Indicator D 5.1 A Number of permanent road closures or access modifications needed;
- Indicator E 1.1 Capital costs including underground and surface subway facilities, fleet and storage; and,
- Indicator E 3.2 C Contains project elements with higher operating and maintenance needs.

Figure 13 - Weights used for Steeles West MATS Analysis



6.2 Overall Scores (Indicator - Level Weights)

The results of the MATS analyses using the indicator-level weights are presented in Table 66 to 69.

6.2.1 Preferred South Subway Alignment (including Sheppard Station Concept)

A total of eight south subway alignments were evaluated. As illustrated in Table 66, South 2 West was the highest ranking south alignment with the highest overall score of 0.641. South 2 West was followed closely by South 1 West and South 2 East each with a total overall score of 0.635 and 0.601 respectively. The lowest ranking south alignments were South 4 West and East, each with a total overall score of 0.321 and 0.397 respectively.

Table 66 – MATS Results for South Subway Alignments (including Sheppard Station)

			Results
Highest Score	Orange	South 1 West	0.635
		South 1 East	0.570
	Pink	South 2 West	0.641
		South 2 East	0.601
	Blue	South 3 West	0.503
		South 3 East	0.481
	Green	South 4 West	0.321
		South 4 East	0.397

6.2.2 Preferred North Subway Alignment and York University Station Concept

Three north subway alignments were evaluated. As illustrated in Table 67. North 2 was the highest ranking north alignment with the highest overall score of 0.399 followed closely by North 3 with a total overall score of 0.366. The lowest ranking north alignment was North 1 with a total overall score of 0.286.

Table 67 – MATS Results for North Subway Alignments (including York University Station)

			Results
Highest Scores	Yellow	North 1 – Yellow	0.286
	Purple	North 2 - Purple	0.399
	White	North 3 – White	0.366

6.2.3 Preferred Finch West Station Concept

A total of five station concepts were evaluated for Finch West. As illustrated in Table 68, the highest ranking Finch West Station concept was Option 5 with the highest overall score of 0.364. Options 2 and 1 followed closely with total overall scores of 0.353 and 0.351 respectively. The lowest station concept for Finch West Station was Option 4 with a total overall score of 0.303.

Table 68 – MATS Results for Finch West Station Concepts		
Results		
Highest Score	Finch West Station Option 1	0.351
	Finch West Station Option 2	0.353
	Finch West Station Option 3	0.310
	Finch West Station Option 4	0.303
	Finch West Station Option 5	0.364

6.2.4 Preferred Steeles West Station Concept

Four station concepts were evaluated for Steeles West Station. Option 1A was the highest ranking Steeles West Station concept with the highest overall score of 0.653 as illustrated in Table 69. Steeles West Station Options 1B and 3 followed with total overall scores of 0.631 and 0.553 respectively. Steeles West Station Option 2 was the lowest ranking station concept with a total overall score of 0.427.

Table 69 - MATS Results for Steeles West Station Concepts

Results		
Highest Scores	Steeles West Station Option 1 A	0.653
	Steeles West Station Option 1 B	0.631
	Steeles West Station Option 2	0.427
	Steeles West Station Option 3	0.553

6.3 Objective - Level Weights

The study team then conducted additional sets of MATS analyses/sensitivity tests using objective-level weighting. The purpose of these additional MATS test was to assess the performances of each subway alignment and station concepts at different weights as well as acquire information on the strengths and weakness of each of the alignments and station concepts.

During this stage of the MATS evaluations, differential weights were assigned to an entire objective. The weights were then subdivided amongst the corresponding criteria and indicators. The study team followed a similar process used in the "indicator-level" MATS evaluations for selecting indicators. Consequently, the indicators used were identified as vital decision-making indicators and selected after thorough consideration.

The five objectives used for the MATS evaluation were incorporated from the ToR:

- Objective A Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC Buses
- Objective B Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue
- Objective C Support local population and employment growth
- Objective D Minimize adverse environmental effects
- Objective E Achieve reasonable capital and operating costs

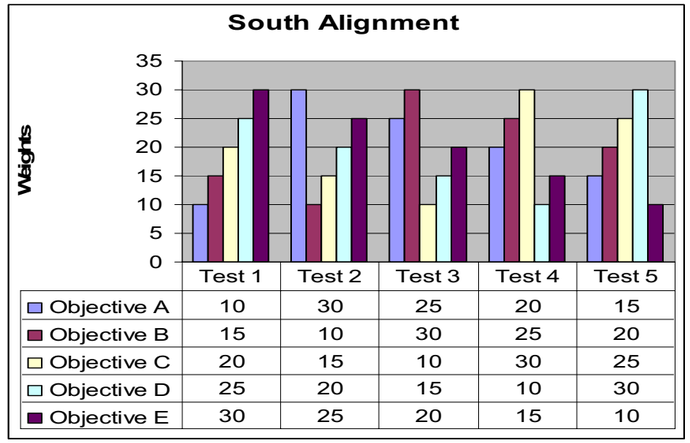
This approach ensured that weights assigned to an entire objective are subdivided proportionally amongst the corresponding criteria and indicators of that objective, similar to a tier system.

For the South Alignments, the study team assigned weights to 24 indicators and conducted 5 MATS sensitivity tests. All weights in MATS are standardized to sum up to 1.0 (100). Thus, the study team divided and subdivided 100 points proportionally between the objectives and corresponding criteria and indicators, from the highest to the lowest. A total of 5 levels were obtained for each objective, namely:

- 30 = highest (most emphasis)
- 25 = Above Average
- 20 = Average
- 15 = Below Average
- 10 = Lowest (least emphasis)

For sensitivity test 1, the study team placed the most emphasis on Objective E by assigning 30 points of the total weight. For the sensitivity test 2, the study team placed the most emphasis on Objective A. The study team placed the most emphasis on Objective B for sensitivity test 3. For sensitivity test 4, the study team placed the most emphasis on objective C. For the final MATS test, the study team placed the most emphasis on Objective D as presented in Figure 14.

Figure 14 – Weights for South Alignments MATS Analysis – Sensitivity Tests

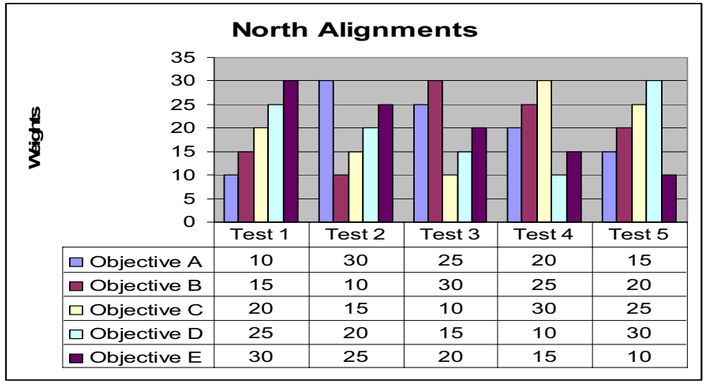


Similar to the South Alignments, the study team conducted 5 MATS sensitivity tests for the North Alignments. A total of 22 indicators were used for the MATS evaluations. The study team divided 100 points proportionally between the 5 objectives, from the highest to the lowest. The 5 levels obtained are as follows:

- 30 = highest (most emphasis)
- 25 = Above Average
- 20 = Average
- 15 = Below Average
- 10 = Lowest (least emphasis)

For sensitivity test 1, the study team placed the most emphasis on Objective E by assigning 30 points of the total weight. For the sensitivity test 2, the study team placed the most emphasis on Objective A which was assigned 30 points. The study team placed the most emphasis on Objective B for sensitivity test 3. For sensitivity test 4, the study team placed the most emphasis on objective C. For the fifth MATS test, the study team placed the most emphasis on Objective D as presented in Figure 15.

Figure 15 – Weights for North Alignments MATS Analysis – Sensitivity Tests

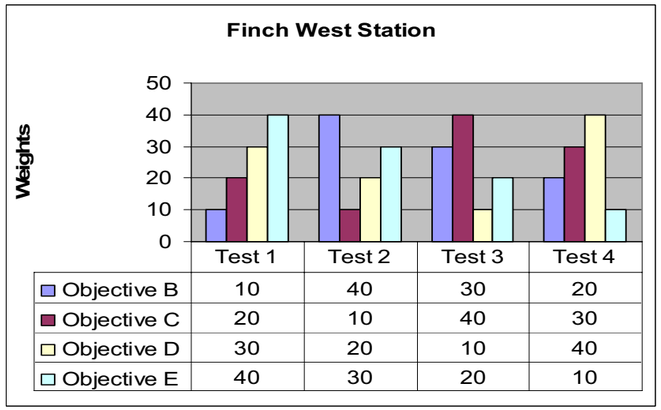


For the Finch West Station, field information obtained for Objective A indicated common impacts for all station concepts; this meant that an evaluation based on Objective A will not yield any notable differences between the station concepts. Thus, 4 MATS sensitivity tests were conducted with the 24 indicators obtained from the remaining 4 objectives. The study team divided 100 points proportionally between the 4 objectives, from the highest to the lowest. A total of 4 levels were obtained, namely:

- 40 = Highest (most emphasis)
- 30 = Above Average
- 20= Below Average
- 10 = Lowest (least emphasis)

As illustrated in Figure 16, the study team placed most emphasis on Objective E by assigning 40 points of the total weight for the first MATS sensitivity test.

Figure 16 – Weights for Finch West MATS Analysis – Sensitivity Tests

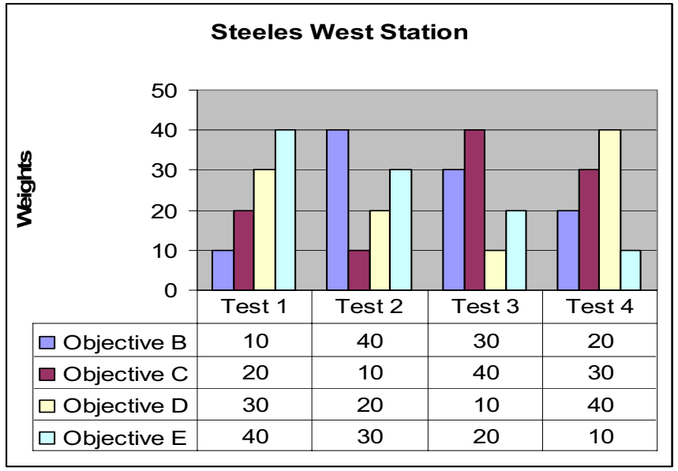


The study team placed the most emphasis on Objective B which was assigned 40 points for test 2; for sensitivity test 3 the most emphasis were placed on Objective C by assigning 40 points of the total MATS weight. For the final MATS test, the study team placed the most emphasis on Objective D.

A total of 4 MATS sensitivity tests were conducted for the Steeles West Station concepts based on the 4 remaining objectives. The study team then divided 100 points proportionally between the 24 indicators, from the highest to the lowest. A total of 4 levels were obtained, namely:

- 40 = Highest (most emphasis)
- 30 = Above Average
- 20= Below Average
- 10 = Lowest (least emphasis)

Figure 17 – Weights for Steeles West MATS Analysis – Sensitivity Tests



The study team placed the most emphasis on Objective E by assigning 40 points of the total MATS weight for the first sensitivity test. For the sensitivity test 2, the study team placed the most emphasis on Objective B which was assigned 40 points. The study team placed the most emphasis on Objective C for sensitivity test 3 with 40 points of the total MATS weight. For the final MATS test, the study team placed the most emphasis on Objective D as presented in Figure 17.

6.3 Overall Scores (Objective Level Weights)

The MATS results obtained from the additional MATS sensitivity tests are presented in the following tables. In general, these additional MATS analyses offered a better understanding of the primary differences between the subway alignments and station concepts.

6.4.1 South Subway Alignment (including Sheppard Station Concept)

The MATS results for the 5sensitivity tests conducted for the South Alignments are presented in Table 70. In most cases, South 2 was the highest ranking option.

Table 70 – Sensitivity Test Results for the South Subway Alignments

Objective	Indicator	Test 1	Test 2	Test 3	Test 4	Test 5
A - Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.**(10, 30,25, 20, 15)**	A 1.1	2.5	7.5	6.25	5	3.75
	A 1.2	2.5	7.5	6.25	5	3.75
	A 2.1A	2.5	7.5	6.25	5	3.75
	A 2.2A	1.25	3.25	3.125	2.5	1.875
	A 2.2B	1.25	3.25	3.125	2.5	1.875
B - Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses. **(15, 10, 30, 25, 20)**	B 1.2	3.75	2.5	7.5	6.25	5
	B 1.1	3.75	2.5	7.5	6.25	5
	B 2.3C	7.5	5	15	12	10
C -Support local population and employment growth. **(20, 15, 10, 30, 25)**	C 1.1A	3.33	2.5	1.6	5	4.16
	C 1.1B	3.33	2.5	1.6	5	4.16
	C 1.1C	3.33	2.5	1.6	5	4.16
	C 2.1B	10	7.5	5	15	12.5
D -Minimize adverse environmental effects. **(25, 20, 15, 10, 30)**	D 1.1A	3.125	2.5	1.87	1.25	3.75
	D 1.2A	3.125	2.5	1.87	1.25	3.75
	D 2.1A	3.125	2.5	1.87	1.25	3.75
	D 2.2A	3.125	2.5	1.87	1.25	3.75
	D 4.1A	3.125	2.5	1.87	1.25	3.75
	D 4.2A	1.56	1.25	0.937	0.625	1.875
	D 4.2B	1.56	1.25	0.937	0.625	1.875
	D 6.1	6.25	5	3.75	2.5	7.5
E - Achieve reasonable capital and operating costs. **(30, 25, 20, 15, 10)**	E 1.1	10	8.3	6.6	5	3.33
	E 2.1	5	4.1	3.33	2.5	1.66
	E 2.2	5	4.1	3.33	2.5	1.66
	E 3.2A	10	8.3	6.6	5	3.33
Highest Score	**MATS Results**					
South 1 West	**Orange**	0.367	0.409	0.388	0.437	0.381
South 1 East		0.336	0.383	0.352	0.407	0.36
South 2 West	**Pink**	0.452	0.467	0.519	0.594	0.527
South 2 East		0.443	0.457	0.51	0.589	0.536
South 3 West	**Blue**	0.44	0.455	0.509	0.581	0.537
South 3 East		0.434	0.448	0.501	0.579	0.553
South 4 West	**Green**	0.362	0.433	0.338	0.396	0.4
South 4 East		0.385	0.449	0.37	0.439	0.435

6.4.2 North Subway Alignment (including York University Station)

The MATS results for the 5 sensitivity tests conducted and the weights assigned for North Subway Alignments are presented in Table 71. In all cases, North 2 was the highest ranking subway alignment followed by N3.

Table 71 - Sensitivity Test Results for the North Subway Alignments

Objective	Indicator	Test 1	Test 2	Test 3	Test 4	Test 5
A - Provide subway service to the Keele/Finch area, York	A 1.3	5	15	12.5	10	7.5
	A 2.1A	2.5	7.5	6.25	5	3.75

Objective	Indicator	Test 1	Test 2	Test 3	Test 4	Test 5
University and a new inter-regional transit terminal at Steeles Avenue.**(10, 30, 25, 20, 15)**	A 2.2A	1.25	3.75	3.125	2.5	1.87
	A 2.2B	1.25	3.75	3.125	2.5	1.87
B - Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses. **(15, 10, 30, 25, 20)**	B 3.1B	1.875	1.25	3.75	3.125	2.5
	B 3.1C	1.875	1.25	3.75	3.125	2.5
	B 3.1D	1.875	1.25	3.75	3.125	2.5
	B 3.1E	1.875	1.25	3.75	3.125	2.5
	B 3.2A	3.75	2.5	7.5	6.25	5
	B 3.2C	3.75	2.5	7.5	6.25	5
C -Support local population and employment growth. **(20, 15, 10, 30, 25)**	C 1.1B	10	7.5	5	15	12.5
	C 1.1C	10	7.5	5	15	12.5
D -Minimize adverse environmental effects. **(25, 20, 15, 10, 30)**	D 1.1A	4.16	3.33	2.5	1.66	5
	D 1.2A	4.16	3.33	2.5	1.66	5
	D 2.1A	4.16	3.33	2.5	1.66	5
	D 2.2A	4.16	3.33	2.5	1.66	5
	D 4.1A	4.16	3.33	2.5	1.66	5
	D 4.2A	2.08	1.66	1.25	0.83	2.5
	D 4.2B	2.08	1.66	1.25	0.83	2.5
E - Achieve reasonable capital and operating costs. **(30, 25, 20, 15, 10)**	E 1.1	10	8.3	6.6	5	3.33
	E 2.2	10	8.3	6.6	5	3.33
	E 3.2A	10	8.3	6.6	5	3.33
Highest Score	**MATS Results**					
North 1	**Yellow**	0.297	0.341	0.291	0.373	0.317
North 2	**Purple**	0.351	0.417	0.471	0.512	0.449
North 3	**White**	0.286	0.363	0.389	0.424	0.348

6.4.3 Finch West Station Concept

The MATS results for the 4 sensitivity tests conducted for the Finch West Station are presented in Table 72. In most cases, Finch West Station Concept 5 was ranked the highest.

Table 72 - Sensitivity Test Results for Finch West Station Concepts

Objective	Indicator	Test 1	Test 2	Test 3	Test 4
B - Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses. **(10, 40, 30, 20)**	B 1.1	1.67	6.6	5	3.3
	B 1.3A	0.83	3.3	2.5	1.65
	B 1.3B	0.83	3.3	2.5	1.65
	B 1.4	1.67	6.6	5	3.3
	B 2.3C	5	20	15	10
C -Support local population and employment growth. **(20, 10, 40, 30)**	C 1.1C	10	5	20	15
	C 2.1A	5	2.5	10	7.5
	C 2.1B	5	2.5	10	7.5
D -Minimize adverse environmental effects. **(30, 20, 10, 40)**	D 1.1A	3	2	1	4
	D 1.2A	3	2	1	4
	D 2.1A	3	2	1	4

Objective	Indicator	Test 1	Test 2	Test 3	Test 4
	D 2.2A	3	2	1	4
	D 4.1A	6	4	2	8
	D 5.2A	1	0.66	0.33	1.33
	D 5.2C	1	0.66	0.33	1.33
	D 5.3B	2	1.33	0.66	2.6
	D 5.4	2	1.33	0.66	2.6
	D 7.1	6	4	2	8
E - Achieve reasonable capital and operating costs. **(40, 30, 20, 10)**	E 1.1	20	15	10	5
	E 2.1	10	7.5	5	2.5
	E 2.2	10	7.5	5	2.5
Highest Score	**MATS Results**				
Finch West Station Option 1		0.264	0.229	0.349	0.379
Finch West Station Option 2		0.262	0.221	0.334	0.382
Finch West Station Option 3		0.295	0.33	0.302	0.379
Finch West Station Option 4		0.305	0.262	0.218	0.323
Finch West Station Option 5		0.372	0.302	0.424	0.458

6.4.4 Steeles West Station Concept

The overall scores for the 4 station concepts evaluated for Steeles West Station are presented in Table 73. In most cases, Steeles West Station Concept 2 was ranked high.

Table 73 – Sensitivity Test Results for Steeles West Station Concepts

Objective	Indicator	Test 1	Test 2	Test 3	Test 4
B - Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses. **(10, 40, 30, 20)**	B 1.1	3.3	13.3	10	6.6
	B 2.2A	0.825	3.33	2.5	1.66
	B 2.2B	0.825	3.33	2.5	1.66
	B 2.3A	1.65	6.6	5	3.3
	B 3.1E	3.3	13.3	10	6.6
C -Support local population and employment growth. **(20, 10, 40, 30)**	C 1.1C	10	5	20	15
	C 2.1A	5	2.5	10	7.5
	C 2.1B	5	2.5	10	7.5
D -Minimize adverse environmental effects. **(30, 20, 10, 40)**	D 1.1A	3.75	2.5	1.25	5
	D 1.2A	3.75	2.5	1.25	5
	D 2.1A	3.75	2.5	1.25	5
	D 2.2A	3.75	2.5	1.25	5
	D 4.1A	3.75	2.5	1.25	5
	D 4.1C	3.75	2.5	1.25	5
	D 5.1A	1.875	1.25	0.625	2.5
	D 5.2A	0.625	0.416	0.208	0.83
	D 5.2B	0.625	0.416	0.208	0.83
	D 5.2C	0.625	0.416	0.208	0.83
	D 5.3B	1.875	1.25	0.625	2.5
	D 5.4	1.875	1.25	0.625	2.5
E - Achieve reasonable capital	E 1.1	13.3	10	6.6	3.3

Objective	Indicator	Test 1	Test 2	Test 3	Test 4
and operating costs. **(40, 30, 20, 10)**	E 2.1	6.6	5	3.33	1.66
	E 2.2	6.6	5	3.33	1.66
	E 3.2C	13.3	10	6.6	3.3
Highest Score	**MATS Results**				
Steeles West Station 1A		0.328	0.44	0.379	0.312
Steeles West Station 1B		0.301	0.418	0.35	0.288
Steeles West Station 2		0.524	0.451	0.526	0.436
Steeles West Station 3		0.389	0.361	0.495	0.453

7.0 Conclusions

The results of the Reasoned Argument Method (RAM) analysis indicated that alignments South 2 West and North 3, as well as Finch Station Option 5 and Steeles West Station Option 1A were the preferred subway alignments and station concepts. These alignments and station options also obtained high overall scores and were ranked high in analysis conducted using the Multi-Attribute Trade –off System (MATS) methodology.

The selection of alignment South 2 West and North 3 as well as Finch Station Option 5 and Steeles West Station Option 1A as the preferred and recommended alignments and station concepts was presented at the third round of public and stakeholder consultation held on October 2 and 6, 2005. A detailed description of the stakeholder and public response to the preferred alignments and station concepts is provided in Appendix A and B – Public Consultation Reports, Issues and Responses.

7.1 Alignment Refinements and Station Modifications

In accordance with comments and suggestions gathered from stakeholders and the general public who attended the third round of Public Consultation Programs held in October 2 and 6, 2005; the South Alignments and the Finch West Station Concepts were modified and refined. This led to development of the following:

- A modified South Alignment (*Modified S 2*) – which runs within the Parc Downsview Park land, approximately 100m south of Sheppard Avenue; and,
- A modified Finch West Station Option 1 (*Option 1A*) – with Bus Terminal fronting Keele Street

A detailed description of the modified versions is provided in the Chapter 7 of the EA document.

In view of these changes, the study team conducted additional MATS analysis to evaluate the modified South S2 West and new Finch West Station Option 1A. Data pertaining to these modified versions were collected for the RAM and MATS analysis. To maintain consistency, the same MATS indicator-level weights (described in Chapter 6.2 of this document) were used by the study team.

The MATS results for both modified South Alignment and Finch West Station concept are provided in Tables 74 and 75.

South Alignment

As presented in Table 74, the overall scores obtained from the MATS analyses, the modified South 2 West obtained higher overall scores than the original South 2 West (0.537 vs. 0.404). South 2 West was already the preferred alignment, so the modification resulted in greater improvement.

Table 74 – MATS Results for Modified South Alignment

MATS Results	
South 2 West	0.404
Modified S2 West	0.537
Highest ranking option	

Finch West Station

Similarly, the Finch West Station Option 1A was the highest ranking Finch West Station when evaluated against Finch West Option 1 and Finch West Option 5 as presented in Table 75. Finch West Station Option 1A obtained an overall score of 0.546, followed by Finch West Station Option 5 with an overall score of 0.434 and Finch West Station Option 1 with an overall score of 0.274.

Table 75 – MATS Results for Modified Finch West Station Concepts

MATS Results	
Finch West Station Option 1	0.274
Finch West Station Option 1 A (*modified Finch West Station Option 1*)	0.546
Finch West Station Option 5	0.434
Highest ranking option	

The preferred (modified) South 2 West alignment, alignment North 3, Finch Station Option 1A and Steeles West Station Option 1A were selected as the technically preferred subway extension and subsequently carried forward to Phase 3 of the EA process – Environmental Assessment and Impact Mitigation Phase.

Appendix 1
Data Sheet for South Alignments

Spadina Subway Extension – Downsview Station to Steeles Avenue
Alternative Methods of Carrying out the Undertaking – Appendix L

			South Alignments (Including Sheppard West Station)							
Objectives	**Criteria**	**Indicators**	**Measures**	**S1 West**	**S1 East**	**S2 West**	**S2 East**	**S3 West**	**S3 East**	**S4 West**	**S4 East**
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	42.5	42.5	40	40	40	40	49	49
		A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	80	80	68	68	68	68	74	74
		A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	3124	2995	3278	3150	3218	3091	2825	2825
			Estimated run times	Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)							
		A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	R=330m @ 459m	R=330m @ 459m	0	0	0	0	0	0
			Length of curves with radii between 457m and 750 m (radius and length)	R=470m @ 692m	R=700m @ 442m R=700m @ 589m Total: 1031m	R=470m @ 753m R=470m @ 791m Total: 1544m	R=470m @ 753m R=700m @ 1178m Total: 1931m	R=580m @ 929m R=470m @ 791m Total: 1720m	R=580m @ 929m R=700m @ 1177m Total: 2106	R=600m @ 719m R=600m @ 768m Total: 1487m	R=600m @ 719m R=600m @ 768m Total: 1487m
B) Provide improved connections between the TTC subway and GO Transit, York Region	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus to subway platform	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from WB on street bus bay to centre of subway platform.(Min.)	2	4	1	1	3	3	8	5

South Alignments (Including Sheppard West Station)											
Transit and TTC buses.		B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	2	2	4	4	3	3	4	4
		B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off,	B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	0	0	0	0	0	0	0	0

South Alignments (Including Sheppard West Station)											
	commuter parking, ambulatory/non-ambulatory disabled persons).	B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no) connection from Sheppard to entrance building	NO	NO	YES	YES	YES	YES	NO	NO
			Entrance type (Staffed/automated)	All stations will include both staffed and automated entrances; location to be confirmed at next phase							
			Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	2	2	2	2	2	2	2	2
	B3) Flexibility for potential future subway extension into York Region.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Area of groundwater discharge.(ha) [100m zone of influence]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Number of residences, businesses and community/ recreational/ institutional facilities.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Number of cultural heritage features. [100m zone of influence]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Compatibility with planned land use.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		B 3.2) Number and type of curves	Total length of alignment (meters)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

South Alignments (Including Sheppard West Station)											
		between Steeles West Station and Highway 407.	Length of curves with radii less than 457 m.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Length of curves with radii between 457 m and 750 m.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C) Support local population and employment growth.	C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within station zone of influence (ha)	28	26	26	25	22	23	10	18
			Amount of redevelopment within station zone of influence	2210	2170	2080	2040	1900	1920	1240	1580
			Amount of redevelopment frontage encumbered by transit facilities (m)	350	330	810	700	730	650	170	170
	C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Active Surveillance (low, medium, high)	LOW	LOW	HIGH	HIGH	HIGH	HIGH	MEDIUM	MEDIUM
D) Minimize adverse environmental effects.	D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	3.37	2.86	2.04	1.64	0	0	0	0
			Type of natural heritage features (ELC classification)	cultural meadow	cultural meadow	cultural meadow	cultural meadow	None	None	None	None
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local	local	None	None	None	None
			Resiliency of natural heritage features (low, medium, high)	High	High	High	High	None	None	None	None
	D1) Potential effects on natural heritage features.	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial	Area of natural heritage features (hectares)	19.48	16.78	10.67	8.32	2.55	2.01	0	0
			Type of natural heritage features (ELC classification)	cultural meadow	cultural meadow	cultural meadow	cultural meadow	cultural meadow	cultural meadow	N/A	N/A

South Alignments (Including Sheppard West Station)											
		landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Significance of natural heritage features (local, regional, provincial, federal)	local	local	local	local	local	local	N/A	N/A
			Resiliency of natural heritage features (low, medium, high)	High	High	High	High	High	High	N/A	N/A
	D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	4.83	5.93	4.59	2.96	3.9	2.22	1.2	1.2
			Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	local	local	local	local	local	local	local	Local
			Area of aquifers affected.	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low	temporary, low
			Significance of aquifers affected. (local, regional, provincial)	local	local	local	local	local	local	local	Local
		D2.2) Potential for soil erosion.	Area of soil to be disturbed.	9.18	8.79	9.64	9.26	9.24	8.87	8.06	8.06
			Type of soil to be disturbed.	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)
	D3) Potential effects on hydrology.	D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	Route selected avoids existing floodplains – no impact							
		D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	Route selected avoids existing watercourses – no impact							
		D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	Surface Storage and treatment Available	Surface Storage and treatment Available	Surface Storage and treatment Available	Surface Storage and treatment Available	OGS	OGS	OGS	OGS
	D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational/institutional facilities located	Number of individual properties directly impacted	19	25	20	28	38	31	38	38

South Alignments (Including Sheppard West Station)											
		within alignment and station footprint areas.									
			Number of Community/Recreational	0	0	0	0	0	0	0	0
			Number of Institution	0	0	0	0	0	0	0	0
		D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Amount of area identified as stable employment within zone of influence (ha)	8	12	15	19	24	27	36	36
			Amount of area identified as stable residential within zone of influence (ha)	10	7	10	8	8	7	5	5
	D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	Number of closures	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Number of entrances/egresses obstructed by average peak hour queue lengths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Number of unsignalized conflict points (total change	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

South Alignments (Including Sheppard West Station)											
			increase/decrease) on the arterial network.								
		D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	D6) Effects on freight and rail passenger service and its signal systems at the GO/Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	93	93	98	98	98	98	105	105
	D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	0	0	0	0	0	0	0	0
			Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	High	High	High	High	High	High	High	High
			Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	0	0	0	0	0	0	0	0
			Number of heritage properties identified during a field review.	0	0	0	0	0	0	0	0
		D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	0	0	0	0	0	0	0	0
			Number of heritage properties identified during a field review.	0	0	0	0	0	0	0	0
	D8) Potential effects on	D8.1) Number, type, and length of	Number of pipeline crossing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

South Alignments (Including Sheppard West Station)											
	pipelines located in the Finch Hydro Corridor	pipelines requiring relocation due to subway extension.	Vertical separation (in meters) between pipelines and subway tunnel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E) Achieve reasonable capital and operating costs.	E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	519	507	525	514	520	508	484	484
	E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	7.6	8.6	7.7	8.2	14.6	20.6	15.3	17.5
		E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	5	6	9	10	10	9	6	6
	E3) Minimize the net operating cost.	E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	3050700	3050700	3050700	3050700	3050700	3050700	3050700	3050700
		E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	1151	1490	1544	1931	1720	2106	1487	1487
			Reduction (addition) to total route length for existing bus services in the study area.	Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is calculated by the difference between time saved and increase of service on some routes (36 Finch West, 60 Steeles West, 35 Jane, 108 Downsview). Total bus hours saved per week is 1411 hrs. Total bus kilometers saved each week is 32600km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.							
			Contains project elements with higher operating & maintenance needs.	NO	NO	NO	NO	NO	NO	NO	NO

Appendix 2
Alignment Data Sheet for North Alignments

North Alignments (Including York University Station)						
Objectives	**Criteria**	**Indicators**	**Measures**	**N1**	**N2**	**N3**
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	23	23	23
		A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	30	30	30
		A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	78000	76700	78000
	A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	3056	2998	2842
			Estimated run times	Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)		
		A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	R=435m @ 688m	0	0
			Length of curves with radii between 457m and 750 m (radius and length)	R=565m @ 444m R=500m @ 793m R=565m @ 375m Total: 1612m	R=500m @ 576m	R=750m @ 768m R=600m @ 545m Total: 1313m
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus to subway platform at Steeles West Station and Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	N/A	N/A	N/A
		B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	N/A	N/A	N/A

North Alignments (Including York University Station)						
		B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	N/A	N/A	N/A
			Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	N/A	N/A	N/A
		B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	N/A	N/A	N/A
	B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	2	2	2
		B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	N/A	N/A	N/A
			Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	N/A	N/A	N/A
		B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	YES	YES	YES
			Entrance type (Staffed/automated)	All stations will include both staffed and automated entrances; location to be confirmed at next phase		
			Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	N/A	N/A	N/A
	B3) Flexibility for	B3.1) Number, type and	Number of natural heritage features.	2	2	2

North Alignments (Including York University Station)						
	potential future subway extension into York Region.	sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Area of groundwater discharge.(ha) [100m zone of influence]	28	21	23
			Number of residences, businesses and community/recreational/ institutional facilities.	1	0	0
			Number of cultural heritage features. [100m zone of influence]	4	1	1
			Compatibility with planned land use.	High - Facilitates expansion into York Region along VCC protected corridor. Supports intensified development along Steeles. N1 conforms to the alignment in the City of Vaughan Planning documents.	High - Facilitates expansion into York Region along VCC protected corridor. Supports intensified development along Steeles.	High - Facilitates expansion into York Region along VCC protected corridor. Supports intensified development along Steeles.
		B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Total length of alignment (meters)	2188	1945	1996
			Length of curves with radii less than 457 m.	0	0	0
			Length of curves with radii between 457 m and 750 m.	R=500m @ 793m	0	R=600m @ 545m
C) Support local population and employment growth.	C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Amount of redevelopment frontage encumbered by transit facilities - minimize (m)	170	190	240
			Amount of area identified with University redevelopment potential on York University lands – maximize (ha)	11.81	6.70	11.81
			Amount of redevelopment frontage within zone of influence -maximize	0	0	0
			Amount of redevelopable frontage on York University lands	1360	520	1360

North Alignments (Including York University Station)						
	C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	N/A	N/A	N/A
			Active Surveillance (low, medium, high)	HIGH	HIGH	HIGH
D) Minimize adverse environmental effects.	D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	1.65	1.65	1.57
			Type of natural heritage features (ELC classification)	cultural meadow	cultural meadow, deciduous forest	cultural meadow, deciduous forest
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local
			Resiliency of natural heritage features (low, medium, high)	High	medium (+)	medium (+)
	D1) Potential effects on natural heritage features.	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Area of natural heritage features (hectares)	13.85	15.92	15.54
			Type of natural heritage features (ELC classification)	cultural meadow, cultural thicket, cultural woodland, meadow marsh, shallow marsh, open aquatic	cultural meadow, meadow marsh, shallow marsh, open aquatic, deciduous forest	cultural meadow, meadow marsh, shallow marsh, open aquatic, deciduous forest
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local
			Resiliency of natural heritage features (low, medium, high)	Medium	Medium (+)	Medium (+)
	D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	3.12	1.82	2.68
			Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	local	local	local
			Area of aquifers affected.	temporary, low	temporary, low	temporary, low
			Significance of aquifers affected. (local, regional, provincial)	local	local	local
		D2.2) Potential for soil erosion.	Area of soil to be disturbed.	8.4	8.38	7.98

North Alignments (Including York University Station)						
			Type of soil to be disturbed.	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	Stone-poor, Carbonates (silty-sandy till)	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay
	D3) Potential effects on hydrology.	D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	Route selected avoids existing floodplains – no impact		
		D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	Route selected avoids existing watercourses – no impact		
		D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	OGS		
	D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational /institutional facilities located within alignment and station footprint areas.	Number of sensitive buildings over or adjacent to the alignment.	3	1	3
			Number of buildings directly impacted on York University Campus – Minimize	0	2	6
			Amount of station/alignment footprint located under a road ROW - maximize	1260	730	480
		D4.2) Area, type, and sensitivity of residences, businesses and community /recreational/institutional facilities located within adjacent zones of influence. (150m)	Area of stable employment within zone of influence (ha)	0.1	6	5
			Area of stable development on the York University Campus within the zone of influence (ha)	46	40	43
	D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	Number of closures	N/A	N/A	N/A
			Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	N/A	N/A	N/A
		D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	N/A	N/A	N/A
			Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	N/A	N/A	N/A

North Alignments (Including York University Station)						
			Number of entrances /egresses obstructed by average peak hour queue lengths	N/A	N/A	N/A
		D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	N/A	N/A	N/A
			Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	N/A	N/A	N/A
		D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	N/A	N/A	N/A
	D6) Effects on freight and rail passenger service and its signal systems at the GO/ Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	N/A	N/A	N/A
	D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	0	0	0
			Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	High	High	High
			Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1
			Number of heritage properties identified during a field review.	1	1	1
		D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1
			Number of heritage properties identified during a field review.	1	1	1
	D8) Potential effects on pipelines located in the Finch Hydro Corridor	D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	4	4	4
			Vertical separation (in meters) between pipelines and subway tunnel	5.3	5.3	5.3

North Alignments (Including York University Station)						
E) Achieve reasonable capital and operating costs.	E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	458	449	460
	E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	0	0	0
		E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	3	11	11
	E3) Minimize the net operating cost.	E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	10290900	10290900	10290900
		E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	1988	1761	1313
			Reduction (addition) to total route length for existing bus services in the study area.	Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is calculated by the difference between time saved and increase of service on some routes (36 Finch West, 60 Steeles West, 35 Jane, 108 Downsview). Total bus hours saved per week is 1411 hrs. Total bus kilometers saved each week is 32600km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.		
			Contains project elements with higher operating & maintenance needs.	NO	NO	NO

Appendix 3
Station Data Sheet for Finch West Station Concepts

Finch West Station(Keele/ Finch)								
Objectives	**Criteria**	**Indicators**	**Measures**	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	86	86	86	86	86
		A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	117	117	117	117	117
		A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	N/A	N/A	N/A	N/A	N/A
	A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	N/A	N/A	N/A	N/A	N/A
			Estimated run times	Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)				
		A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	N/A	N/A	N/A	N/A	N/A
			Length of curves with radii between 457m and 750 m (radius and length)	N/A	N/A	N/A	N/A	N/A
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus platform to subway platform Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	4	4	2	2	3
		B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway	N/A	N/A	N/A	N/A	N/A

Finch West Station(Keele/ Finch)								
			platform.(Min)					
		B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	5	5	8	5	6
			Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	3	4	3	4	2
		B1.4) Transfer from subway to future LRT in hydro corridor at Finch West Station.	Potential to provide a connection from subway platform to LRT in Hydro corridor/new LRT terminal.	HIGH	High	Low	Low	Medium
	B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	1	1	1	1	1
		B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	5	5	5	5	5
			Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	6	6	6	6	6

Finch West Station(Keele/ Finch)								
		B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	NO	NO	NO	NO	NO
			Entrance type (Staffed/automated)	All stations will included both staffed and automated entrances; location to be confirmed at next phase				
			Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	2	2	1	2	2
	B3) Flexibility for potential future subway extension into York Region.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	N/A	N/A	N/A	N/A	N/A
			Area of groundwater discharge.(ha) [100m zone of influence]	N/A	N/A	N/A	N/A	N/A
			Number of residences, businesses and community/recreational/ institutional facilities.	N/A	N/A	N/A	N/A	N/A
			Number of cultural heritage features. [100m zone of influence]	N/A	N/A	N/A	N/A	N/A
			Compatibility with planned land use.	N/A	N/A	N/A	N/A	N/A
		B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Total length of alignment (meters)	N/A	N/A	N/A	N/A	N/A
			Length of curves with radii less than 457 m.	N/A	N/A	N/A	N/A	N/A
			Length of curves with radii between 457 m and 750 m.	N/A	N/A	N/A	N/A	N/A
C) Support local population and employment growth.	C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within zone of influence (ha)	All have equal potential				
			Amount of redevelopment frontage within zone of influence (m)	Equal frontage for all station concepts (approx. 700 m)				

Finch West Station(Keele/ Finch)								
			Developable frontage encumbered by station amenities - length of Right of Way (meters)	125	70	195	195	15
	C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	9300	8900	20400	31200	12900
			Active Surveillance (low, medium, high)	HIGH	LOW	MEDIUM	MEDIUM	LOW
D) Minimize adverse environmental effects.	D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	2.51	2.51	2.51	2.51	2.51
			Type of natural heritage features (ELC classification)	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh	Cultural meadow, meadow marsh
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local	local	Local
			Resiliency of natural heritage features (low, medium, high)	medium	medium	medium	medium	Medium
	D1) Potential effects on natural heritage features.	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Area of natural heritage features (hectares)	3.93	4.12	4.12	4.12	4.12
			Type of natural heritage features (ELC classification)	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh	Cultural meadow, meadow marsh
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local	local	Local
			Resiliency of natural heritage features (low, medium, high)	Medium	Medium	Medium	Medium	Medium
	D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if	Area of groundwater recharge/discharge affected. (ha)	0	0	0.02	0	0.02

Finch West Station(Keele/ Finch)								
		any) on hydrogeological conditions.	Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	local	local	local	local	Local
			Area of aquifers affected.	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate
			Significance of aquifers affected. (local, regional, provincial)	local	local	local	local	Local
		D2.2) Potential for soil erosion.	Area of soil to be disturbed.	7.4	6.5	2.91	3.96	3.43
			Type of soil to be disturbed.	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)
	D3) Potential effects on hydrology.	D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	Route selected avoids existing floodplains – no impact				
		D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	Route selected avoids existing watercourses – no impact				
		D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	OGS				
	D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community /recreational/institutional facilities located within alignment and station footprint areas.	Number of businesses directly affected	23	33	3	3	5
			Number of Community/Recreational facilities impacted	0	0	0	0	0
			Number of Institution buildings impacted.	0	0	0	0	0
		D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within	Area of stable residential within zone of influence (ha)	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.				
			Area of stable employment within	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.				

Finch West Station(Keele/ Finch)								
		adjacent zones of influence. (150m)	zone of influence (ha)					
	D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	Number of closures	0	0	0	0	0
			Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	0	0	0	0	0
		D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	27	21	22	26	21
			Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	6	6	6	6	6
			Number of entrances/egresses obstructed by average peak hour queue lengths	1	0	2	4	2
		D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	16	16	16	16	16
			Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	-7	-9	-2	-2	-4
		D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	6	7	6	6	6
	D6) Effects on freight and rail passenger service and its signal systems at the GO/Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	N/A	N/A	N/A	N/A	N/A

Finch West Station(Keele/ Finch)								
	D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	0	0	0	0	0
			Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	Medium	High	High	High	High
			Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	0	0	0	0	0
			Number of heritage properties identified during a field review.	0	0	0	0	0
		D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1	1	1
			Number of heritage properties identified during a field review.	1	1	1	1	1
	D8) Potential effects on pipelines located in the Finch Hydro Corridor	D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	N/A	N/A	N/A	N/A	N/A
			Vertical separation (in meters) between pipelines and subway tunnel	N/A	N/A	N/A	N/A	N/A
E) Achieve reasonable capital and operating costs.	E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	34	34	33	34	31
	E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	36.8	39.6	17.9	9.6	19.3
		E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	24	24	24	20	24

Finch West Station(Keele/ Finch)								
	E3) Minimize the net operating cost.	E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	3318000	3318000	3318000	3318000	3318000
		E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	N/A	N/A	N/A	N/A	N/A
			Reduction (addition) to total route length for existing bus services in the study area.	Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is calculated by the difference between time saved and increase of service on some routes (36 Finch West, 60 Steeles West, 35 Jane, 108 Downsview). Total bus hours saved per week is 1411 hrs. Total bus kilometers saved each week is 32600km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.				
			Contains project elements with higher operating & maintenance needs.	NO	NO	NO	NO	NO

Appendix 4

Station Data Sheet for Steeles West Station Concepts

Steeles West Station							
	Objectives	Criteria	Indicators	Measures	Option 1A	Option 1B	Option 2	Option 3
	A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	0	0	0	0
			A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	30	30	30	30
			A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	N/A	N/A	N/A	N/A
		A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	N/A	N/A	N/A	N/A
				Estimated run times	Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)			
			A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	N/A	N/A	N/A	N/A
				Length of curves with radii between 457m and 750 m (radius and length)	N/A	N/A	N/A	N/A
	B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus to subway platform at Steeles West Station and Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	3	3	5	4
			B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	N/A	N/A	N/A	N/A
			B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	N/A	N/A	N/A	N/A

Steeles West Station							
			Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	N/A	N/A	N/A	N/A
		B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	N/A	N/A	N/A	N/A
	B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	0	0	0	0
		B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	6	6	2	6
			Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	7	8	6	7
		B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	YES	YES	NO	YES
			Entrance type (Staffed/automated)	All stations will include both staffed and automated entrances; location to be confirmed at next phase			
			Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	N/A	N/A	N/A	N/A
	B3) Flexibility for potential future subway extension into York Region.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	N/A	N/A	N/A	N/A
			Area of groundwater discharge.(ha) [100m zone of influence]	N/A	N/A	N/A	N/A
			Number of residences, businesses and community/recreational/ institutional facilities.	N/A	N/A	N/A	N/A

Steeles West Station							
			Number of cultural heritage features. [100m zone of influence]	N/A	N/A	N/A	N/A
			Ability to modify station to reflect changing bus demands	High	High	Medium	Low
		B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Total length of alignment (meters)	N/A	N/A	N/A	N/A
			Length of curves with radii less than 457 m.	N/A	N/A	N/A	N/A
			Length of curves with radii between 457 m and 750 m.	N/A	N/A	N/A	N/A
C) Support local population and employment growth.	C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Assess the potential for redevelopment and the types of built form H > 40ha, 39>M>20, L< 20	All have equal potential			
			Amount of redevelopment frontage within zone of influence	Equal frontage for all station concepts (approx. 400 m)			
			Amount of redevelopment frontage encumbered by transit facility	290	290	90	90
	C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	5400	6600	2300	2300
			Active Surveillance (low, medium, high)	Medium	Medium	Medium	High
D) Minimize adverse environmental effects.	D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	14.78	14.52	12.55	13.19
			Type of natural heritage features (ELC classification)	cultural meadow	cultural meadow	cultural meadow	cultural meadow
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local	local
			Resiliency of natural heritage features (low, medium, high)	High	High	High	High
	D1) Potential effects on natural heritage features.	D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent	Area of natural heritage features (hectares)	9.2	8.57	10.66	10.23
			Type of natural heritage features (ELC classification)	cultural meadow, cultural woodland	cultural meadow, cultural woodland	cultural meadow, cultural woodland	cultural meadow, cultural woodland
			Significance of natural heritage features (local, regional, provincial, federal)	local	Local	local	local

Steeles West Station							
		zones of influence.(100m)	Resiliency of natural heritage features (low, medium, high)	High	High	High	High
	D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	9.98	8.36	8.52	9.06
			Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	local	local	local	local
			Area of aquifers affected.	temporary, moderate	temporary, moderate	temporary, moderate	temporary, moderate
			Significance of aquifers affected. (local, regional, provincial)	local	local	local	local
		D2.2) Potential for soil erosion.	Area of soil to be disturbed.	16.46	16.83	13.58	13.41
			Type of soil to be disturbed.	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay	Stone-poor Carbonate(silty-sandy till) & interbedded flow till, rainout deposits, silt & clay
	D3) Potential effects on hydrology.	D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	Route selected avoids existing floodplains – no impact			
		D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	Route selected avoids existing watercourses – no impact			
		D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	OGS			Surface Storage and treatment Available
	D4) Potential effects on socio-economic features.	D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Number of Employment	2	2	2	3
			Number of Community/Recreational	0	0	0	0
			Number of Institution	1	1	0	0

Steeles West Station							
		D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Ability to minimize impact on existing stable residential lands within zone of influence (High < 25 ha, 25 ha < Medium <40, Low >40)	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.			
			Ability to minimize impact on existing stable employment lands within zone of influence (High < 25 ha, 25 ha < Medium <40, Low >40)	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.			
	D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	Number of closures	0	0	(1) Prohibition of E-W Road for Transit Use Only	0
			Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	0	0	0	0
		D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	42	40	40	39
			Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	10	10	10	11
			Number of entrances/egresses obstructed by average peak hour queue lengths	0	1	0	0
		D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	22	22	22	22
			Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	2	4	7	1
		D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	9	9	9	10
	D6) Effects on freight and rail passenger service and its signal systems at the GO/Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	N/A	N/A	N/A	N/A

Steeles West Station							
	D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	0	0	0	0
			Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	High	High	High	High
			Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1	1
			Number of heritage properties identified during a field review.	1	1	1	1
		D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1	1
			Number of heritage properties identified during a field review.	1	1	1	1
	D8) Potential effects on pipelines located in the Finch Hydro Corridor	D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	N/A	N/A	N/A	N/A
			Vertical separation (in meters) between pipelines and subway tunnel	N/A	N/A	N/A	N/A
E) Achieve reasonable capital and operating costs.	E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	121	122	112	138
	E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	3.4	4.2	0.6	1.7
		E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	2	2	0	0
	E3) Minimize the net operating cost.	E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	7929600	7929600	7929600	7929600
		E3.2) Operations and maintenance cost of the	Total length of track on curve (all radii).	N/A	N/A	N/A	N/A

Steeles West Station							
		subway extension, including feeder bus operations.	Reduction (addition) to total route length for existing bus services in the study area.	Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is calculated by the difference between time saved and increase of service on some routes (36 Finch West, 60 Steeles West, 35 Jane, 108 Downsview). Total bus hours saved per week is 1411 hrs. Total bus kilometers saved each week is 32600km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.			
			Contains project elements with higher operating & maintenance needs.	NO	NO	NO	YES - TTC expects significant Operating & Maintenance to bus terminals on structures (e.g. Warden, Victoria Park, Wilson)

Appendix 5
Interpretation of RAM Analysis and Results for South Alignments

Appendix 5 – RAM Analysis and Results for South Alignments

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	Low	Yes	South 4 Alignments will have better connections to existing population due to the fact that it is right in the middle of the Keele Industrial Area	South 4 Alignments will have better connections to existing population due to the fact that it is right in the middle of the Keele Industrial Area	In this Criteria, South 4 Alignment is the best.	The overall weighting of this Objective is low. South 4 West and South 4 East Sheppard West station alignments are the best in terms of establishing connection to existing and future population within the area. This is primarily due to the fact that these two alignments impede upon the Keele Industrial area which has a population base substantially than the others which includes Downsview park. Ranking second is South 2 and South 3 Options. This is explainable due to the fact that it still encroaches upon some existing commercial land North of Sheppard Avenue. South 1 Options is the worst in this circumstance because it is situated mostly in Downsview
A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	Low	Yes	South 4 Alignments will have better connections to future population due to the fact that it is right in the middle of the Keele Industrial Area	South 4 Alignments will have better connections to existing population due to the fact that it is right in the middle of the Keele Industrial Area		
A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	No	No- The alignment does not impede on York University Property, therefore this criteria does not apply.				
A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	No	No - Even though there is a difference in length, this makes no appreciable difference.				
	Estimated run times	No	No - Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)				
A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	No	No - The number of curves under 450m makes no appreciable difference.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Length of curves with radii between 457m and 750 m (radius and length)	No	No - The number of curves under 450m makes no appreciable difference.				Park which is currently empty grass land.
B1.1) Transfer time from bus to subway platform	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from WB on street bus bay to centre of subway platform.(Min.)	High	Yes	The best Alignments are South Option 2. This is due to the close proximity of Sheppard Avenue.	The best Alignments are South Option 2. This is due to the close proximity of Sheppard Avenue.	The best Alignments are South Option 2. This is due to the close proximity of Sheppard Avenue.	Overall, the best alignment is still Option 2. This is due to the fact that it provides both a shorter traveling time to subway platform from an on-street bus bay at Sheppard Avenue and that it provides a weather protected area for pedestrian which increases pedestrian safety and comfort. The worst options are South 4 options. This is due to the fact that it is the furthest location in terms of stations to the GO platform compared to other options. The walking distance from the middle of the Keele Industrial Area to the centre of platform at GO platform, no matter if its located at North or South of Sheppard, is still considerably longer than others.
B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	No	No - Due to the fact that there will be a direct connection from the subway platform to the GO transit station, this criteria does not make an appreciable difference.				
B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	No	No - There is no Bus facility associated with Sheppard West Station Options				
	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	No	No - There is no Bus facility associated with Sheppard West Station Options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	No	No - Future LRT is in Finch Hydro Corridor and is not within this context.				
B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	No	No - All station concepts is directly upon a cycling path therefore, there are no distinguishable difference.			The best alignments are South 2 and South 3 since they have the most potential to have protected walkways for pedestrians. This is primarily due to the fact that the station locations allow for a tunnel pedestrian walkway connection to Sheppard Avenue, therefore providing a sheltered (weather protected) passage way.	
B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	No	No - There is no PPUDO associated with this facility.				
	Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	No	No - There is no Parking Facility associated with this station layout.				
B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no) connection from Sheppard to entrance building	Low	Yes	The best alignments are South 2 and South 3 since they have the most potential to have protected walkways for pedestrians.	The best alignments are South 2 and South 3 since they have the most potential to have protected walkways for pedestrians.		
	Entrance type (Staffed/automated)	No	No – Both staffed and automated entrances				
	Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical	No	No - Since all entrances are located at approximately the same place (end of platform), the traveling difference in time is				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	movement .Max time(Min)		inconsequential.				
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Area of groundwater discharge.(ha) [100m zone of influence]	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Number of residences, businesses and community/recreational/ institutional facilities.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Number of cultural heritage features. [100m zone of influence]	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	· Compatibility with planned land use.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
B 3.2) Number and type of curves between Steeles	Total length of alignment (meters)	No	No - This does not apply to South Alignments				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
West Station and Highway 407.	Length of curves with radii less than 457 m.	No	No - This does not apply to South Alignments				
	Length of curves with radii between 457 m and 750 m.	No	No - This does not apply to South Alignments				
C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within station zone of influence (ha)	High	Yes	In this circumstance, the best option is S1 West. This is considerably better because of a future redevelopment zone which falls within the station's zone of influence at the west end of Sheppard Avenue.	The best option in this indicator is still South 1 West. This is due to the amount of potential redevelopment that this station location offers in the future. The worst is South 4 West station since it offers almost no room for redevelopment.	The best option in this indicator is still South 1 West. This is due to the amount of potential redevelopment that this station location offers in the future. The worst is South 4 West station since it offers almost no room for redevelopment.	Overall, The best alignment for this objective is still South 1 West station option with South 1 East and South 2 West station option being equal seconds. The worst options are still South 4 options. This is once again due to its location within the Downsview park area which severely restricts its potential to redevelop.
	Amount of redevelopment within station zone of influence	High	Yes	In this circumstance, the best option is S1 West. This is considerably better because of a future redevelopment zone which falls within the station's zone of influence at the west end of Sheppard Avenue.			
	Amount of redevelopment frontage encumbered by transit facilities (m)	Low	Yes	Since South Option 4 station locations are not located at a major road (I.e. Sheppard Avenue West), it has the least amount of redevelopment frontage encumbered by transit facilities.			
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	No	No - Since there are no bus platform associated, this does not apply.		The best options are South 2 and South 3 (due to Active surveillance)	The best options are South 2 and South 3 Alignments	

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Active Surveillance (low, medium, high)	Low	Yes	The best options are South 2 and South 3 Alignments for Active Surveillance.			
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	Low	Yes	The lowest impact on natural heritage is South 3 and South 4 options. This is due to the fact that it avoids Downsview park.	South 3 and South 4 Alignments are the best in this indicator while the rest are equal seconds. This is due to the fact that South 3 and South 4 Alignments do not impede on Downsview park lands.	South 3 and South 4 Alignments are the best in this indicator while the rest are equal seconds. This is due to the fact that South 3 and South 4 Alignments do not impede on Downsview park lands.	Overall, because the number of direct impact is more important, S1West and S2 West are the most favorable, with S1East and S2 East being Second. It is found that there are almost no impacts to surrounding areas in terms of zones of influence. Option 4 West and Option 4 East is identified as the worst location while South 3 West and South 3 East are in the middle range.
	Type of natural heritage features (ELC classification)	Low	No - It is difficult to rank the alignment options by type of natural heritage features.				
	Significance of natural heritage features (local, regional, provincial, federal)	Low	No - There is no appreciable difference from local, regional, provincial and federal natural heritage features.				
	Resiliency of natural heritage features (low, medium, high)	Medium	Yes	All of the options are equal			
D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within	Area of natural heritage features (hectares)	No	No - There is no significant difference, therefore, this is not considered.				
	Type of natural heritage features (ELC classification)	No	No - There is no significant difference, therefore, this is not considered.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
adjacent zones of influence.(100m)	Significance of natural heritage features (local, regional, provincial, federal)	No	No - There is no significant difference, therefore, this is not considered.				
	Resiliency of natural heritage features (low, medium, high)	No	No - There is no significant difference, therefore, this is not considered.				
D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	No	No - There is no significant difference, therefore, this is not considered.				
	Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	No	No - There is no significant difference, therefore, this is not considered.				
	Area of aquifers affected.	No	No - There is no significant difference, therefore, this is not considered.				
	Significance of aquifers affected. (local, regional, provincial)	No	No - There is no significant difference, therefore, this is not considered.				
D2.2) Potential for soil erosion.	Area of soil to be disturbed.	No	No - There is no significant difference, therefore, this is not considered.				
	Type of soil to be disturbed.	No	No - There is no significant difference, therefore, this is not considered.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	No	No - Route selected avoids existing floodplains – no impact				
D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	No	No - Route selected avoids existing watercourses – no impact				
D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	No	No - There is no significant difference, therefore, this is not considered.				
D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Number of individual properties directly impacted	High	Yes	In terms of number of properties directly affected, South 1 West and South 2 West are almost equal in terms of direct impact. South 1 East and South 2 East are second.	In terms of number of properties directly affected, South 1 West and South 2 West are almost equal in terms of direct impact. South 1 East and South 2 East are second. The worst option is still South 4 West and East station locations due to the fact that it goes through the Keele Industrial area.	South 1 and South 2 Options are the best, with South 1 West and South 1 East platform being better.	
	Number of Community/Recreational	No	No - There are no Community/Recreational facilities within this area.				
	Number of Institution	No	No – There are no institution within this area.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Amount of area identified as stable employment within zone of influence (ha)	High	Yes	South 1 West has the lowest effect on stable employment within zone of influence, therefore is the best option. South 1 East is the second Best. This is due to the fact that it is located in Downsview park lands.	South 1 West is the best option. South 1 East is the second Best. This is due to the fact that these options are located within Downsview lands. South 4 options are once again the worst due to its location within the Downsview park area.		
	Amount of area identified as stable residential within zone of influence (ha)	Low	Yes	Due to the fact that Option 4 is located within the Keele Industrial area, and that there are no stable residential zones within, it has the lowest impact.			
D5.1) Number of permanent road closures or access modifications.	Number of closures	No	No - There are no permanent road closures associated with all of the options.				
	Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	No	No - There are no driveways with reduced access associated with the options.				
D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	No	No - Since there are no bus platform or roads associated with the station.				
	Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	No	No - The subway platform will not cause intersection delays due to the fact that it doest not interact with traffic.				
	Number of entrances/egresses obstructed by average peak hour queue lengths	No	No - The subway platform will not obstruct queue lengths because it does not interact with traffic.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	No	No - The subway platform will not obstruct queue lengths because it does not interact with traffic.				
	Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	No	No - The subway platform will not obstruct queue lengths because it does not interact with traffic.				
D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	No	No - The subway platform will not obstruct queue lengths because it does not interact with traffic.				
D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	Low	South 1 Options, due to its freedom at Downsview park lands, has the best angle of crossing at CN Line.	South 1 Options, due to its freedom at Downsview park lands, has the best angle of crossing at CN Line.	South 1 Options, due to its freedom at Downsview park lands, has the best angle of crossing at CN Line.	South 1 Options, due to its freedom at Downsview park lands, has the best angle of crossing at CN Line.	
D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	No	There are no known archaeological sites within this area.				
	Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	No	All options have equal measure.				
	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	All options have equal measure.				
	Number of heritage properties identified	No	All options have equal measure.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	during a field review.						
D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	All options have equal measure.				
	Number of heritage properties identified during a field review.	No	All options have equal measure.				
D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	No	No - Major Utility pipelines are located in Finch Corridor				
	Vertical separation (in meters) between pipelines and subway tunnel	No	No - Major Utility pipelines are located in Finch Corridor				
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	No	Yes	South 4 West and South 4 East options has the lowest capital construction costs while South 1 East is ranked second.	South 4 West and South 4 East options has the lowest capital construction costs while South 1 East is ranked second.	South 4 West and South 4 East options has the lowest capital construction costs while South 1 East is ranked second.	Overall, In terms of cost, the most cost effective is actually South 4 West, with South 4 East, South 1 West, South 1 East being seconds. South 2 west, South 2 East and South 3 West station options are ranked third while south 3 East is the worst option.
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	High	Yes	In terms of Property cost, the South 1 and South 2 options are the best due to Downsview lands. South 3 East is the worst due to the location of a plaza.	In terms of Property cost, the South 1 and South 2 options are the best due to Downsview lands. South 3 East is the worst due to the location of a plaza.	In terms of Property cost, the South 1 and South 2 options are the best due to Downsview lands. South 3 East is the worst due to the location of a plaza.	
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	No	No - the number of contaminated sites are similar in terms of the options.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	No	No - The annual ridership are not affected by the options.			South 1 West is the best in this criteria because it is the most direct (most straight) path. This will decrease maintenance and operation costs. South 1 East, South 2 West, South 4 East and South 4 West were equal seconds while the rest (South 2 East, South 3 West and South 3 East) are the worst comparatively due to its large curvature.	
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	Medium	Yes	South 1 West is the best in this criteria because it is the most direct (most straight) path.	South 1 West is the best in this criteria because it is the most direct (most straight) path.		
	Reduction (addition) to total route length for existing bus services in the study area.	No	No - Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. They are all identified as the same in this criteria.				
	Contains project elements with higher operating & maintenance needs.	No	No - There are no project elements with higher operating costs in this area.				

Appendix 6
Interpretation of RAM Analysis and Results for North Alignments

Appendix 6 – RAM Analysis and Results for North Alignments

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	No	No - No difference between options				
A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	No	No - No difference between options				
A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	No	No -Does not apply in this category				
A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	No	No -Does not apply in this category				
	Estimated run times	No	No - Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)				
A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	No	No -Does not apply in this category				
	Length of curves with radii between 457m and 750 m (radius and length)	No	No -Does not apply in this category				
B1.1) Transfer time from bus to subway platform at Steeles West Station and Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	No	No -Does not apply in this category				The preferred Alignment is N2 and N3, with N1 being slightly less preferred due to the number of

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	· Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	No	No -Does not apply in this category				impacts in terms of ground water discharge, residences and cultural heritage.
B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	No	No -Does not apply in this category				
	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	No	No -Does not apply in this category				
B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	No	No -Does not apply in this category				
B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	No	No - Equal in this category - Bike path goes through Keele Street and is same distance				
B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	No	No -Does not apply in this category				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	No	No -Does not apply in this category				
B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	No	No - All options provide underground access				
	Entrance type (Staffed/automated)	No	NO – Both Staffed and automated entrances, location to be confirmed				
	Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	No	No -Does not apply in this category				
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	No	No - All options are same		The preferred Alignment is N2 and N3, with N1 being slightly less preferred due to the number of impacts in terms of ground water discharge, residences and cultural heritage.	The preferred Alignment is N2 and N3, with N1 being slightly less preferred due to the number of impacts in terms of ground water discharge, residences and cultural heritage.	
	Area of groundwater discharge.(ha) [100m zone of influence]	Low	Yes	Options 2 and options 3 are slightly better than Option 1			
	Number of residences, businesses and community/recreational/ institutional facilities.	Low	Yes	Options 2 and options 3 are slightly better than Option 1			
	Number of cultural heritage features. [100m zone of influence]	Low	Yes	Options 2 and options 3 are slightly better than Option 1			
	Compatibility with planned land use.	Low	Yes	All options are equal due to the use of hydro corridor lands.			
B 3.2) Number and type of curves between Steeles	Total length of alignment (meters)	No	No - Minor differences				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
West Station and Highway 407.	Length of curves with radii less than 457 m.	No	No - No difference between options				
	Length of curves with radii between 457 m and 750 m.	No	No - Minor differences				
C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within station zone of influence	High	Yes	All options are equal in this category due to its close proximity to each other.	Option 1 is slightly better than option 2 and 3 because of it provides less encumbrance to redevelopable frontage.	Option 1 is slightly better than option 2 and 3 because of it provides less encumbrance to redevelopable frontage.	Option 1 is slightly better than option 2 and 3 because of it provides less encumbrance to redevelopable frontage.
	Amount of redevelopment frontage within station zone of influence (ha)	High	Yes	All options are equal in this category due to its close proximity to each other.			
	Amount of redevelopable frontage encumbered by transit facilities (meters)	High	Yes	Option 1 is slightly better due to its shorter run on Keele Street.			
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	No	No - Does not apply				
	Active Surveillance (low, medium, high)	No	No - No difference between options				
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	Low	Yes	The best option here is Option N3	Overall, Options N3 and N1are equal firsts. This is however, a low category.	Overall, Options N3 and N1are equal firsts. This is however, a low category.	In terms of impacts, Option N3 is the best that it provides the least impact overall.
	Type of natural heritage features (ELC classification)	Low	Yes	The best option is Option N1			
	Significance of natural heritage features (local, regional, provincial, federal)	No	No - No difference between options				
	Resiliency of natural heritage features (low, medium, high)	No	No - almost the same				
D1.2) Area, type, significance and	Area of natural heritage features (hectares)	No	No - almost the same				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Type of natural heritage features (ELC classification)	No	No - almost the same				
	Significance of natural heritage features (local, regional, provincial, federal)	No	No - No difference between options				
	Resiliency of natural heritage features (low, medium, high)	No	No - No difference between options				
D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	No	No - almost the same				
	Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	No	No - No difference between options				
	Area of aquifers affected.	No	No - No difference between options				
	Significance of aquifers affected. (local, regional, provincial)	No	No - No difference between options				
D2.2) Potential for soil erosion.	Area of soil to be disturbed.	No	No - almost the same				
	Type of soil to be disturbed.	No	No - almost the same				
D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	No	No - Route selected avoids existing floodplains – no impact				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	No	No - Route selected avoids existing watercourses – no impact				
D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	No	NO - All routes are same				
D4.1) Number of employment properties and community /recreational/institutional facilities located within alignment and station footprint areas.	Number of sensitive buildings over or adjacent to the alignment.	Low	Yes	In terms of number of sensitive buildings, Options N3 and N1 provide the least impact.	In terms of number of sensitive buildings, Options N3 and N1 provide the least impact.	Overall, Options 2 and 3 are equal in this criteria and better than Option 1.	
D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Area of stable employment within zone of influence (ha)	Low	Yes	In terms of stable employment within zone of influence, Option N1 has slightly less area.	Option N2 is the best.		
	Area of stable development on the York University Campus within the zone of influence (ha)	Low	Yes	Option N2 is the best option while N1 is the worst.			
D5.1) Number of permanent road closures or access modifications.	Number of closures	No	No - Does not apply				
	Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	No	No - Does not apply				
D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	No	No - Does not apply				
	Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	No	No - Does not apply				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Number of entrances/egresses obstructed by average peak hour queue lengths	No	No - Does not apply				
D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	No	No - Does not apply				
	Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	No	No - Does not apply				
D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	No	No - Does not apply				
D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	No	No - Does not apply				
D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	No	NO - All routes are same				
	Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	No	NO - All routes are same				
	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	NO - All routes are same				
	Number of heritage properties identified during a field review.	No	NO - All routes are same				
D7.2) Number, type, significance and sensitivity of archaeological sites, built	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	NO - All routes are same				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties identified during a field review.	No	NO - All routes are same				
D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	No	NO - All routes are same				
	Vertical separation (in meters) between pipelines and subway tunnel	No	NO - All routes are same				
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	Low	No - almost the same				Overall, N3 is better due to the fact that it has the least length of track on curve therefore avoiding a lot of operations and maintenance cost.
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	Yes	NO - All routes are same	Options N2 is better than others due to the fact that it avoids complications in connections to buildings.	Options N2 is better than others due to the fact that it avoids complications in connections to buildings.	Options N2 is better than others due to the fact that it avoids complications in connections to buildings.	
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	Yes	No - Zone of influence does has less impact than expected.	Option 1 is slightly better in this category due to the fact that it resides in most amount of road right-of-ways	Option 1 is slightly better in this category due to the fact that it resides in most amount of road right-of-ways	Option 1 is slightly better in this category due to the fact that it resides in most amount of road right-of-ways	
E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	No	NO - All routes are same			Option N3 is the best since it offers the most direct alignment and therefore has less curvature.	
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	High	Yes	Option N3 is the best since it offers the most direct alignment and therefore has less curvature.	Option N3 is the best since it offers the most direct alignment and therefore has less curvature.		

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Reduction (addition) to total route length for existing bus services in the study area.	No	No - Approximate estimate of changes in connecting bus resources as a result of possible spadina subway extension is the same.				
	Contains project elements with higher operating & maintenance needs.	No	No - No difference between options				

Appendix 7
Interpretation of RAM Analysis and Results for Finch West Station Concept

Appendix 7 - RAM Analysis and Results for Finch West Station Concept

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	No	No - No difference between options				
A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	No	No - No difference between options				
A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	No	No -Does not apply in this category				
A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	No	No -Does not apply in this category				
	Estimated run times	No	No - Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)				
A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	No	No -Does not apply in this category				
	Length of curves with radii between 457m and 750 m (radius and length)	No	No -Does not apply in this category				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
B1.1) Transfer time from bus platform to subway platform Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	Low	Yes	Compare to other options, Options 3 and 4 offers the shortest traveling time from bus bay to centre of subway platform. The difference, however, are in the order of minutes and are relatively minor.	Compared to other options, Options 3 and 4 offers the shortest traveling time from bus bay to centre of subway platform. The difference, however, are in the order of minutes and are relatively minor.	Option 5 turns out to be the best option for this criteria with option 1 being second. Options 2 and 4 are equal thirds while options 3 is the worst.	Option 5 turns out to be the best option for this objective with option 1 being second. Options 2 and 4 are equal thirds while options 3 is the worst. This is primarily due to the fact that Option 5 and 1 provides the shortest delay times for the bus routes.
B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	No	No -Does not apply in this category				
B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	High	Yes	In this measure, Option 1,2,3,4 are equal firsts while option 3 is clearly the worst option.	Options 1 and Options 5 seemed to be coming on top in this indicator.		
	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at	Medium	Yes	The best option for Keele street is the option 5, with options 1 and 3 being 1 minute behind.			

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	key intersections.(Min) [41 Keele]						
B1.4) Transfer from subway to future LRT in hydro corridor at Finch West Station.	Potential to provide a connection from subway platform to LRT in Hydro corridor/new LRT terminal.	Medium	Yes	Options 1 and 2, due to its location, provides the best potential to establish a connection from subway platform to LRT in the hydro corridor.	Options 1 and 2, due to its location, provides the best potential to establish a connection from subway platform to LRT in the hydro corridor.		
B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	No	No - All options show same result				
B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	No	No - All options show same result				
	Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	No	No - All options show same result				
B2.3) Quality of walking	Weather protected (yes/no)	No	No - All options show same result				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
environment from other travel modes to subway platform.	Entrance type (Staffed/automated)	No	No – Both staffed and automated entrances, location to be confirmed at next phase				
	Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	No	No - The options are relatively similar.				
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Area of groundwater discharge.(ha) [100m zone of influence]	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Number of residences, businesses and community/recreational/ institutional facilities.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Number of cultural heritage features. [100m zone of influence]	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
	Compatibility with planned land use.	No	No - There are none identified within the study Area that will potentially affect the future extension into York Region.				
B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Total length of alignment (meters)	No	No - This does not apply to South Alignments				
	Length of curves with radii less than 457 m.	No	No - This does not apply to South Alignments				
	Length of curves with radii between 457 m and 750 m.	No	No - This does not apply to South Alignments				
C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within zone of influence (ha)	No	No - All options have equal potential		In this indicator Option 2 and option 5 is clearly the best since it is out of the frontage area.	In this indicator Option 2 and option 5 is clearly the best since it is out of the frontage area.	Overall, Options 5 and Options 2 are the best options in this measure with options 1 being third. The worst options are Option 4 which has the least potential to support population growth and development.
	Amount of redevelopment frontage within zone of influence (m)	No	No - All options have equal frontage (approx 700m)				
	Developable frontage encumbered by station amenities - length of Right of Way (meters)	High	Yes	In this measure, Option 2 and option 5 is clearly the best since it is out of the frontage area.			

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	Low	Yes	Options 1, 2 and 5 provides the lowest conflicts at key uncontrolled intersections. The worst option in this case is option 4.	The best option is Options 1 with Options 5 and options 2.	The best option is Options 1 with Options 5 and options 2.	
	Active Surveillance (low, medium, high)	Low	Yes	In terms of active surveillance, Option 1 is the best.			
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	No	No - All options have equal are of natural heritage features (2.51 hectares)				Overall, the best option is option 3, due to its low impacts to the surround businesses. The worst option is option 2 primarily due to the same reason. In this objective, the number of businesses directly impacted has a higher significance.
	Type of natural heritage features (ELC classification)	No	No - All options have same type of heritage features.				
	Significance of natural heritage features (local, regional, provincial, federal)	No	No - All equal in this option				
	Resiliency of natural heritage features (low, medium, high)	No	No - All equal in this option				
D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/commu	Area of natural heritage features (hectares)	No	No - insignificant difference in terms of area of natural heritage features.				
	Type of natural heritage features (ELC classification)	No	No - Same type of natural heritage features.				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
nities and populations/species located within adjacent zones of influence.(100m)	Significance of natural heritage features (local, regional, provincial, federal)	No	No - All equal in this option				
	Resiliency of natural heritage features (low, medium, high)	No	No - All equal in this option				
D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	No	No - Insignificant difference in terms of area of ground water discharge/recharge affected.				
	Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	No	No - All equal in this option				
	Area of aquifers affected.	No	No - All equal in this option				
	Significance of aquifers affected. (local, regional, provincial)	No	No - All equal in this option				
D2.2) Potential for soil erosion.	Area of soil to be disturbed.	No	No - insignificant difference between options				
	Type of soil to be disturbed.	No	No - All equal in this option				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	No	No - route selected avoids existing floodplains - no impact				
D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	No	No - route selected avoids existing watercourses - no impact				
D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	No	No - All equal in this option				
D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Number of businesses directly affected	High	Yes	Finch West option 3 and 4 provides the least impact to businesses in the area due to its location while Option 2 is the worst due to the fact that it resides what is currently a strip mall.	Finch West option 3 and 4 provides the least impact to businesses in the area due to its location while Option 2 is the worst due to the fact that it resides what is currently a strip mall.	Finch West option 3 and 4 provides the least impact to businesses in the area due to its location while Option 2 is the worst due to the fact that it resides what is currently a strip mall.	
	Number of Community/ Recreational facilities impacted	No	No - No difference between options				
	Number of Institution buildings impacted.	No	No - No difference between options				
D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located	Area of stable residential within zone of influence (ha)	No	No - Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
within adjacent zones of influence. (150m)			for these alignments.				
	Area of stable employment within zone of influence (ha)	No	No - Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.				
D5.1) Number of permanent road closures or access modifications.	Number of closures	No	No - No difference between options			Option 2 is the best option while option 4 is the worst. This is because Option 2 uses current exits and therefore does not obstruct them while option 4 will.	
	Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	No	No - No difference between options				
D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	No	No - Insignificance difference between options		Option 2 is the best option while option 4 is the worst. This is because Option 2 uses current exits and therefore does not obstruct them while option 4 will.		
	Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	No	No - No difference between options				
	Number of entrances/egresses obstructed by average peak hour queue lengths	Low	Yes	Option 2 uses current exits and therefore does not obstruct them while option 4 will.			
D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	No	No - No difference between options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Number of unsignalized conflict points (total change increase/ decrease) on the arterial network.	No	No - Insignificance difference between options				
D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	No	No - Insignificance difference between options				
D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	No	No - does not apply in this case				
D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	No	No - No difference between options				
	Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	No	No - Insignificance difference between options				
	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	No - No difference between options				
	Number of heritage properties identified during a field review.	No	No - No difference between options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	No - No difference between options				
	Number of heritage properties identified during a field review.	No	No - No difference between options				
D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	No	No - does not apply in this case				
	Vertical separation (in meters) between pipelines and subway tunnel	No	No - does not apply in this case				
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	No	No - Insignificance difference between options				In terms of property costs, Option 4 is the preferred option with option 3 and option 5 being second. Option 1 and option 2 are expensive because of the strip mall that it replaces.
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	Medium	Yes	In terms of property costs, Option 4 is the preferred option with option 3 and option 5 being second. Option 1 and option 2 are expensive because of the strip mall that it replaces.	In terms of property costs, Option 4 is the preferred option with option 3 and option 5 being second. Option 1 and option 2 are expensive because of the strip mall that it replaces.	In terms of property costs, Option 4 is the preferred option with option 3 and option 5 being second. Option 1 and option 2 are expensive because of the strip mall that it replaces.	
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	No	No - Insignificance difference between options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	No	No - No difference between options				
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	No	No - does not apply in this case				
	Reduction (addition) to total route length for existing bus services in the study area.	No	No - Approximate estimate of changes in connecting bus resources as a result of possible spadina subway extension is the same.				
	Contains project elements with higher operating & maintenance needs.	No	No - No difference between options				

Appendix 8

Interpretation of RAM Analysis and Results for Steeles West Station Concepts

Appendix 8 - RAM Analysis and Results for Steeles West Station Concepts

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
B1.1) Transfer time from bus to subway platform at Steeles West Station and Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	Low	Yes	Options 1A and 1B provides the shortest walking time. Options 2 is the furthest due to its location in the hydro corridor.	Options 1A and 1B provides the shortest walking time. Options 2 is the furthest due to its location in the hydro corridor.	Options 1A and 1B provides the shortest walking time. Options 2 is the furthest due to its location in the hydro corridor.	Option 1A and Option 1B is the best options while option 2 is the worst due to its restrictions at the hydro corridor
B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	No	No - N/A				
B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	No	No – N/A				
	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	No	No – N/A				
B1.4) Transfer time from subway to future LRT in hydro corridor at Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of LRT platform to centre of subway platform. (Min)	No	No –N/A				
B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	No	No – No difference between options				
B2.2) Transfer time from other travel modes to subway	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	No	No - Minor differences				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
platform.	Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	No	No - Minor differences				
B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	High	Yes	All options except Option 2 provide weather protection. This is because there is a restriction in building within the hydro corridor.	All options except Option 2 provide weather protection. This is because there is a restriction in building within the hydro corridor.		
	Entrance type (Staffed/automated)	No	NO –Both staffed and automated entrances, location will be confirmed				
	Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	No	No – N/A				
B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	No	No – N/A		Option 2 and Option 3 has the least potential to modify station due to the fact that option 3 is a stacked terminal and option 2 is within the hydro corridor.	Option 2 and Option 3 has the least potential to modify station due to the fact that option 3 is a stacked terminal and option 2 is within the hydro corridor.	
	Area of groundwater discharge.(ha) [100m zone of influence]	No	No – N/A				
	Number of residences, businesses and community/recreational/ institutional facilities.	No	No –N/A				
	Number of cultural heritage features. [100m zone of influence]	No	No –N/A				
	Ability to modify station to reflect changing bus demands	High	Yes	Option 2 and Option 3 has the least potential to modify station due to the fact that option 3 is a stacked terminal and option 2 is within the hydro corridor.			
B 3.2) Number and	Total length of alignment (meters)	No	No –N/A				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
type of curves between Steeles West Station and Highway 407.	Length of curves with radii less than 457 m.	No	No – N/A				
	Length of curves with radii between 457 m and 750 m.	No	No – N/A				
C1.1) Ability to combine stations with the existing and future built form.	Assess the potential for redevelopment and the types of built form H > 40ha, 39>M>20, L< 20	No	No - All have equal potential		Due to the fact that Option 2 and 3 is away from Steeles Avenue, it provides the most frontage.	Due to the fact that Option 2 and 3 is away from Steeles Avenue, it provides the most frontage.	Overall, Options 2 and 3 is better than options 1A and 1B due to its location; Option 2 within the hydro corridor and option 3 being a stacked terminal.
	Amount of redevelopment frontage within zone of influence	No	No -Equal frontage for all station concepts (approx. 400m)				
	Amount of redevelopment frontage encumbered by transit facility	High	Yes	Due to the fact that Option 2 and 3 is away from Steeles Avenue, it provides the most frontage.			
C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	No	No		Option 2 and 3 provides the most active surveillance.	Option 2 and 3 provides the most active surveillance.	
	Active Surveillance (low, medium, high)	Medium	Yes	Option 2 and 3 provides the most active surveillance.			
D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	No	No - Minor differences				Overall, Option 1A and option 3 causes the least impact and therefore is the best option. Option 2, due to the closure of East-West road to normal traffic, becomes the worst.
	Type of natural heritage features (ELC classification)	No	No - No difference between options				
	Significance of natural heritage features (local, regional, provincial, federal)	No	No - No difference between options				
	Resiliency of natural heritage features (low, medium, high)	No	No - No difference between options				
D1.2) Area, type, significance and sensitivity of aquatic and terrestrial	Area of natural heritage features (hectares)	No	No - Minor differences				
	Type of natural heritage features (ELC classification)	No	No - No difference between options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Significance of natural heritage features (local, regional, provincial, federal)	No	No - No difference between options				
	Resiliency of natural heritage features (low, medium, high)	No	No - No difference between options				
D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	No	No - Minor differences				
	Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	No	No - No difference between options				
	Area of aquifers affected.	No	No - No difference between options				
	Significance of aquifers affected. (local, regional, provincial)	No	No - No difference between options				
D2.2) Potential for soil erosion.	Area of soil to be disturbed.	No	No - Minor differences				
	Type of soil to be disturbed.	No	No - No difference between options				
D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	No	No - Route selected avoids existing floodplains - no impact				
D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (meters/hectares).	No	No - Route selected avoids existing watercourses - no impact				
D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	No	No				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
D4.1) Number of employment properties and community/recreational/institutional facilities located within alignment and station footprint areas.	Number of Employment	No	No - Minor differences				
	Number of Community/Recreational	No	No - No difference between options				
	Number of Institution	No	No - Minor differences				
D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Ability to minimize impact on existing stable residential lands within zone of influence (High < 25 ha, 25 ha < Medium <40, Low >40)	No	No - Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.				
	Ability to minimize impact on existing stable employment lands within zone of influence (High < 25 ha, 25 ha < Medium <40, Low >40)	No	No - Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.				
D5.1) Number of permanent road closures or access modifications.	Number of closures	High	Yes	Option 2 will close the new East-West road for bus only purposes and therefore is the worst option.	Option 2 will close the new East-West road for bus only purposes and therefore is the worst option.	Overall, Option 1A and option 3 causes the least impact and therefore is the	

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
	Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	No	No - No difference between options			best option. Option 2, due to the closure of East-West road to normal traffic, becomes the worst.	
D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	No	No - Minor differences				
	Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	No	No - Minor differences				
	Number of entrances/egresses obstructed by average peak hour queue lengths	No	No - Minor differences				
D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	No	No - No difference between options		In terms of unsignalized conflict points, option 1A and Option 3 has the least impact and therefore is the best.		
	Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	Low	Yes	In terms of unsignalized conflict points, option 1A and Option 3 has the least impact and therefore is the best.			
D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	No	No - Minor differences				
D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	No	No -Does not apply in this category				
D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features	Number of known archaeological sites.	No	No - No difference between options				
	Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	No	No - No difference between options				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
and cultural landscapes located within alignment and station footprint areas.	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	No - No difference between options				
	Number of heritage properties identified during a field review.	No	No - No difference between options				
D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	No	No - No difference between options				
	Number of heritage properties identified during a field review.	No	No - No difference between options				
D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	No	No – N/A				
	Vertical separation (in meters) between pipelines and subway tunnel	No	No – N/A				
E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	High	Yes	Options 2 is the best since there is restriction on building on hydro corridor, not much can be built therefore capital costs are minimized.	Options 2 is the best since there is restriction on building on hydro corridor, not much can be built therefore capital costs are minimized.	Options 2 is the best since there is restriction on building on hydro corridor, not much can be built therefore capital costs are minimized.	Overall in terms of cost, option 2 is the cheapest since it is built within the hydro corridor and that there is construction limits. Option 1A and 1B are second and are the same while option 3 is the worst considering its stacked form.
E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	Low	Yes	Option 1B is the worst since it covers two different properties, while option 2 is the best since it is the hydro corridor.	Option 1B is the worst since it covers two different properties, while option 2 is the best since it is the hydro corridor.	Option 1B is the worst since it covers two different properties, while option 2 is the best since it is the hydro corridor.	
E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	No	No - Minor differences				

Indicators	Measures	Weighting	Difference between Alignments (from Analysis)	Preferred Alignment based on Measure	Preferred Alignment based on Indicator	Preferred Alignment based on Criteria	Preferred Alignment based on Objective
E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders. (Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	No	No - No difference between options			The stacked terminal Option 3 is the most expensive to maintain while the others are all similar.	
E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	No	No -Does not apply in this category		The stacked terminal Option 3 is the most expensive to maintain while the others are all similar.		
	Reduction (addition) to total route length for existing bus services in the study area.	No	No - Approximate estimate of changes in connecting bus resources as a result of possible spadina subway extension is the same.				
	Contains project elements with higher operating & maintenance needs.	High	Yes	The stacked terminal Option 3 is the most expensive to maintain while the others are all similar.			

Appendix 9
Station Data Sheet for Modified Finch West Station Concept

Modified Finch West Station Concepts						
Objectives	**Criteria**	**Indicators**	**Measures**	**Option 1**	**Option 1A**	**Option 5**
A) Provide subway service to the Keele/Finch area, York University and a new inter-regional transit terminal at Steeles Avenue.	A1) Potential for riders to walk to local stations.	A1.1) Existing population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	86	86	86
		A1.2) Future population and employment within 500 m walking distance of subway stations.	Number of people and employees within 500 m radius of main entrance (Population per Hectare)	117	117	117
		A1.3) Students, faculty and staff within 500 m walking distance of the York University station.	Number of people and employees within 500 m radius of main entrance (based on Data provided to URS by York University)	N/A	N/A	N/A
	A2) Speed and comfort for subway passengers.	A2.1) Travel time from Downsview Station to Steeles West Station.	Total length of alignments (meters).	N/A	N/A	N/A
			Estimated run times	Difference in travel time between fastest and slowest alignment is imperceptible to transit riders (<20 seconds)		
		A2.2) Speed and comfort for subway passengers.	Length of Curves with Radii less than 457m (radius and length)	N/A	N/A	N/A
			Length of curves with radii between 457m and 750 m (radius and length)	N/A	N/A	N/A
B) Provide improved connections between the TTC subway and GO Transit, York Region Transit and TTC buses.	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.1) Transfer time from bus platform to subway platform Finch West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from middle bus bay to centre of subway platform.(Min.)	4	1	3
		B1.2) Transfer time from GO Rail to subway platform at Sheppard West Station.	Walking time based on 1.2 m/s + 10 second premium for every vertical movement measured from centre of GO platform to centre of subway platform.(Min)	N/A	N/A	N/A
		B1.3) Delay time for through passengers on the 36-Finch West bus route and the 41-Keele bus route at Finch West Station.	Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections [36 Finch]. (Min)	5	4	4
			Total travel time (excluding internal circulation and dwell time within the station) based on travel time (assumed 30 km/hr) + additional delays for specific movements at key intersections.(Min) [41 Keele]	3	1	1
B) Provide improved connections between the TTC	B1) Convenience for transfers from bus and train operations (including Wheeltrans).	B1.4) Transfer from subway to future LRT in hydro corridor at Finch West Station.	Potential to provide a connection from subway platform to LRT in Hydro corridor/new LRT terminal.	High	High	medium

Modified Finch West Station Concepts						
subway and GO Transit, York Region Transit and TTC buses. .	B2) Convenience for access from other travel modes (taxi, bicycle, pedestrians, passenger pick up and drop off, commuter parking, ambulatory/non-ambulatory disabled persons).	B2.1) Opportunity to link with cycling routes identified in the City of Toronto's and City of Vaughan's Cycling Master Plans.	Cycling time based on 15 km/h from entrance to identified bike path/bike lanes in cycling master plans.(Min)	1	1	1
		B2.2) Transfer time from other travel modes to subway platform.	Walking time based on 1.2 m/s from PPUDO/taxi stand to closest station entrance. (Min)	5	2	4
			Walking time based on 1.2 m/s from middle of commuter parking lot to closest station entrance.(Min)	6	1	5
		B2.3) Quality of walking environment from other travel modes to subway platform.	Weather protected (yes/no)	NO	YES	NO
			Entrance type (Staffed/automated)	All stations will include both staffed & automated entrances. Location to be confirmed at next phase.		
			Walking time from pedestrian entrance/bicycle racks to subway platform based on 1.2 m/s + 10 second premium for every vertical movement .Max time(Min)	2	2	2
	B3) Flexibility for potential future subway extension into York Region.	B3.1) Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.	Number of natural heritage features.	N/A	N/A	N/A
			Area of groundwater discharge.(ha) [100m zone of influence]	N/A	N/A	N/A
			Number of residences, businesses and community/recreational/ institutional facilities.	N/A	N/A	N/A
			Number of cultural heritage features. [100m zone of influence]	N/A	N/A	N/A
			Compatibility with planned land use.	N/A	N/A	N/A
		B 3.2) Number and type of curves between Steeles West Station and Highway 407.	Total length of alignment (meters)	N/A	N/A	N/A
			Length of curves with radii less than 457 m.	N/A	N/A	N/A
			Length of curves with radii between 457 m and 750 m.	N/A	N/A	N/A
C) Support local population and employment growth.	C1) Maximize redevelopment potential in support of the subway extension.	C1.1) Ability to combine stations with the existing and future built form.	Amount of area identified as redevelopment within zone of influence (ha)	All have equal potential		
			Amount of redevelopment frontage within zone of influence (m)	Equal frontage for all station concepts (approx. 700 m)		
			Developable frontage encumbered by station amenities - length of Right of Way (m)	125	125	15

				Modified Finch West Station Concepts		
	C2) Maximize the potential to create a high quality urban/pedestrian environment.	C2.1) Potential to create a safe environment for pedestrians, cyclists and transit passengers.	Number of pedestrian-bus conflicts at key uncontrolled station entrances (I.e. bus forecasts x pedestrian movements)	9300	9300	12900
			Active Surveillance (low, medium, high)	High	High	Low
D) Minimize adverse environmental effects.	D1) Potential effects on natural heritage features.	D1.1) Area, type, significance and resiliency of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within alignment and station footprint areas.	Area of natural heritage features (hectares)	2.51	2.51	2.51
			Type of natural heritage features (ELC classification)	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local
			Resiliency of natural heritage features (low, medium, high)	medium	medium	medium
		D1.2) Area, type, significance and sensitivity of aquatic and terrestrial landscapes, ecosystems/communities and populations/species located within adjacent zones of influence.(100m)	Area of natural heritage features (hectares)	3.93	3.93	4.12
			Type of natural heritage features (ELC classification)	cultural meadow, meadow marsh	cultural meadow, meadow marsh	cultural meadow, meadow marsh
			Significance of natural heritage features (local, regional, provincial, federal)	local	local	local
			Resiliency of natural heritage features (low, medium, high)	Medium	Medium	Medium
	D2) Potential effects on geology and hydrogeology.	D2.1) Magnitude and significance of permanent groundwater drawdown (if any) on hydrogeological conditions.	Area of groundwater recharge/discharge affected. (ha)	0	0	0.02
			Significance of groundwater recharge/discharge areas affected. (local, regional, provincial)	local	local	local
			Area of aquifers affected.	temporary, low to moderate	temporary, low to moderate	temporary, low to moderate
			Significance of aquifers affected. (local, regional, provincial)	local	local	local
		D2.2) Potential for soil erosion.	Area of soil to be disturbed.	7.4	7.4	3.43
			Type of soil to be disturbed.	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)	Stone-poor, Carbonates (silty-sandy till)
	D3) Potential effects on hydrology.	D3.1) Area of flood storage capacity removed.	Area of flood storage capacity removed (hectares).	Route selected avoids existing floodplains – no impact		
D) Minimize adverse environmental effects.	D3) Potential effects on hydrology.	D3.2) Length/area of watercourses/ waterbodies altered.	Length/area of surface water features (metres/hectares).	Route selected avoids existing watercourses – no impact		
		D3.3) Ease and effectiveness of stormwater management at subway facilities.	Opportunities consistent with City of Toronto WWFMMP	OGS		
	D4) Potential effects on	D4.1) Number of employment	Number of businesses directly affected	23	2	5

				Modified Finch West Station Concepts		
	socio-economic features.	properties and community /recreational/institutional facilities located within alignment and station footprint areas.	Number of Community/Recreational facilities impacted	0	0	0
			Number of Institution buildings impacted.	0	0	0
		D4.2) Area, type, and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence. (150m)	Area of stable residential within zone of influence (ha)	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.		
			Area of stable employment within zone of influence (ha)	Due to the redevelopment potential and ownership structure, impact on stable lands is not considered relevant for these alignments.		
	D5) Potential effects on pedestrian and traffic access/ flow.	D5.1) Number of permanent road closures or access modifications.	Number of closures	2	2	0
			Number of driveways with reduced access (e.g. full access reduced to right-in/right-out)	0	0	0
		D5.2) Traffic Impacts due to operations of station commuter facilities (bus terminals, passenger pick-up and drop-off and commuter parking).	Number of critical movements within vicinity of station	27	27	21
			Sum of intersection delays (in Min) at key intersections at an approximate 250m radius from station.	6	6	6
			Number of entrances/egresses obstructed by average peak hour queue lengths	1	2	2
		D5.3) Impact on safety of transportation system.	Number of new signalized conflict points (total change increase/ decrease) on the arterial network.	16	16	16
			Number of unsignalized conflict points (total change increase/decrease) on the arterial network.	-7	-7	-4
		D5.4) Accessibility for emergency services including fire, police and ambulance.	Impact on response times for EMS services (Number of critical intersections within study area).	6	6	6
D) Minimize adverse environmental effects.	D6) Effects on freight and rail passenger service and its signal systems at the GO/Sheppard subway station.	D6.1) Impacts on the operation of the CN Newmarket/GO Bradford rail line during construction and operation of the subway extension.	Angle of crossing at CN line (degrees)	N/A	N/A	N/A
D) Minimize adverse environmental effects.	D7) Potential effects on cultural heritage resources.	D7.1) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within alignment and station footprint areas.	Number of known archaeological sites.	0	1	0
			Unlikeliness of the discovery of archaeological remains (Low/Medium/High).	Medium	Medium	High
			Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	0	0	0
			Number of heritage properties identified during a field review.	0	0	0

Modified Finch West Station Concepts						
		D7.2) Number, type, significance and sensitivity of archaeological sites, built heritage features and cultural landscapes located within adjacent zones of influence. (100m)	Number of heritage properties on municipal inventory or designated under the Ontario Heritage Act.	1	1	1
			Number of heritage properties identified during a field review.	1	1	1
	D8) Potential effects on pipelines located in the Finch Hydro Corridor	D8.1) Number, type, and length of pipelines requiring relocation due to subway extension.	Number of pipeline crossing	N/A	N/A	N/A
			Vertical separation (in meters) between pipelines and subway tunnel	N/A	N/A	N/A
E) Achieve reasonable capital and operating costs.	E1) Minimize the capital costs.	E1.1) Capital costs including underground and surface subway facilities, fleet and storage.	Capital costs estimated in 2005 dollars after GST Rebate $(millions)	34	34	34
	E2) Minimize the costs of property acquisition.	E2.1) Total property cost.	Estimated real estate costs in 2005 dollars. (million)	36.8	36.8	9.1
		E2.2) Potential environmental cleanup costs.	Number of known or potential contaminated sites within zone of influence of subway extension.	24	24	24
	E3) Minimize the net operating cost.	E3.1) The dollar value of net fare and other revenues including commuter parking.	Total annual ridership on subway extension measured in number of riders.(Table 14, Route 1 Station usage and link volume forecasts 2021 - opportunities land use - AM Peak Period.	3318000	3318000	3318000
		E3.2) Operations and maintenance cost of the subway extension, including feeder bus operations.	Total length of track on curve (all radii).	N/A	N/A	N/A
			Reduction (addition) to total route length for existing bus services in the study area.	Approximate estimate of changes in connecting bus resources as a result of a possible Spadina Subway extension to Steeles Avenue. The resulting bus hours and bus kilometers saved each week is calculated by the difference between time saved and increase of service on some routes (36 Finch West, 60 Steeles West, 35 Jane, 108 Downsview). Total bus hours saved per week is 1411 hrs. Total bus kilometers saved each week is 32600km. Bus resources saved are 25 morning peak buses and 18 afternoon peak buses.		
			Contains project elements with higher operating & maintenance needs.	NO	NO	NO

TTC Spadina/ University Subway Extension EA
Alignment Selection Phase II

The Planning Partnership • *October 2005*

Table of Contents

1.0

Purpose of this Report

1.0 PURPOSE OF THIS REPORT

This report is a companion to the land use planning and urban design components of the Evaluation Matrix. In order to support the process and conclusions of the Evaluation Matrix, this report will explain in more detail the areas of analysis, the review process and the outcomes.

The overall goals of the land use planning and urban design review for the alignments, station locations and the surface transit facility designs are to:

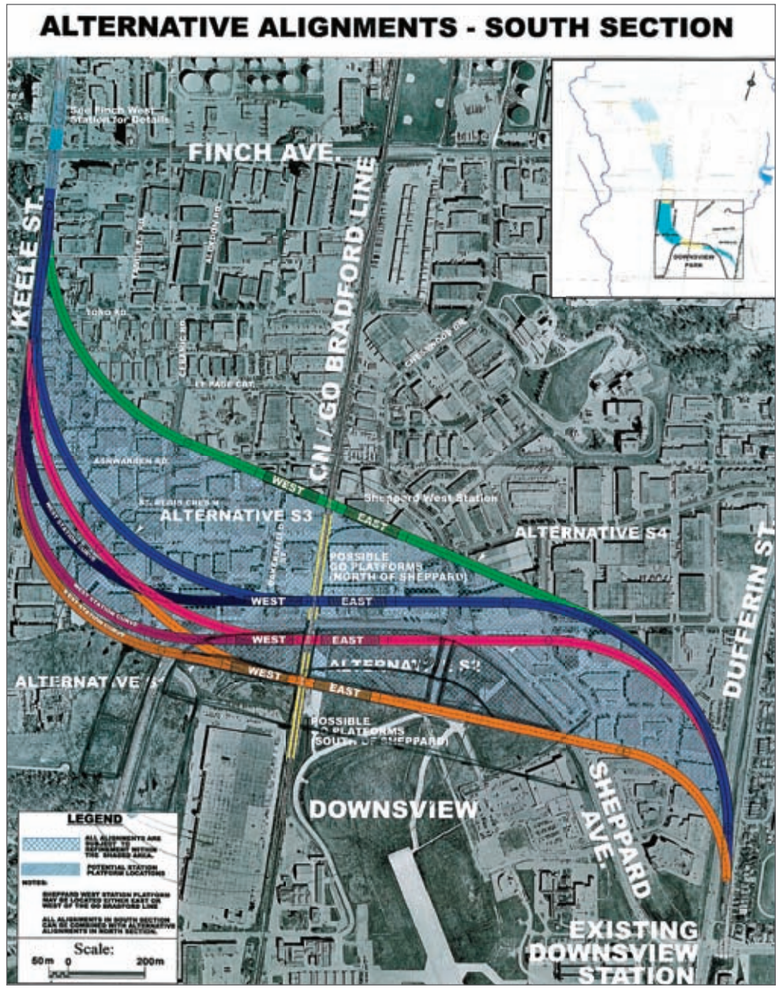
- minimize the impacts on stable land uses;
- maximize redevelopment potential; and,
- maximize the potential to create a high quality urban/pedestrian environment.

The purpose of this report is to provide land use planning and urban design input into the broader evaluation of:

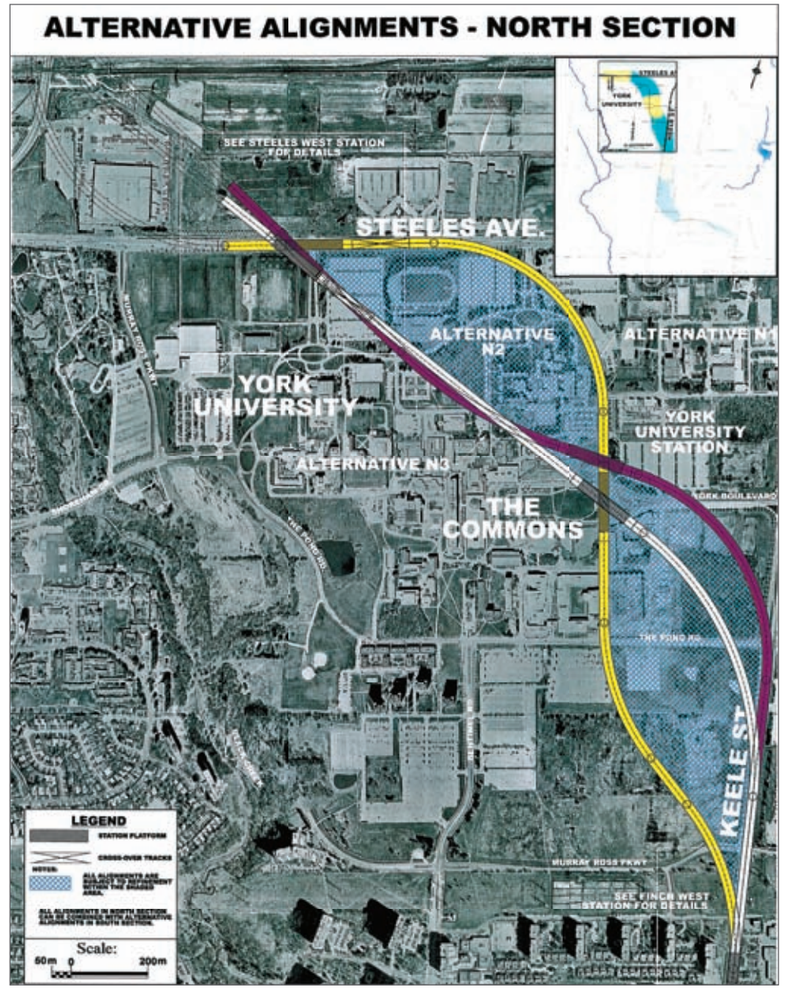
1. The alignment options for the Spadina Subway extension from the existing Downsview Station, through York University to Steeles Avenue (Maps 1 and 2);

2. The potential subway station locations along each of the alignment alternatives at Sheppard West, Finch West, York University and Steeles West (also Maps 1 and 2); and,

3. The range of surface transit facility configurations (including bus terminals, commuter parking lots and passenger drop-off/pick-up facilities) at Finch and at Steeles West.



Map 1. Alternative Alignments - South Section



Map 2. Alternative Alignments - North Section

2.0 Methodology

2.0 METHODOLOGY

2.1 Base Information

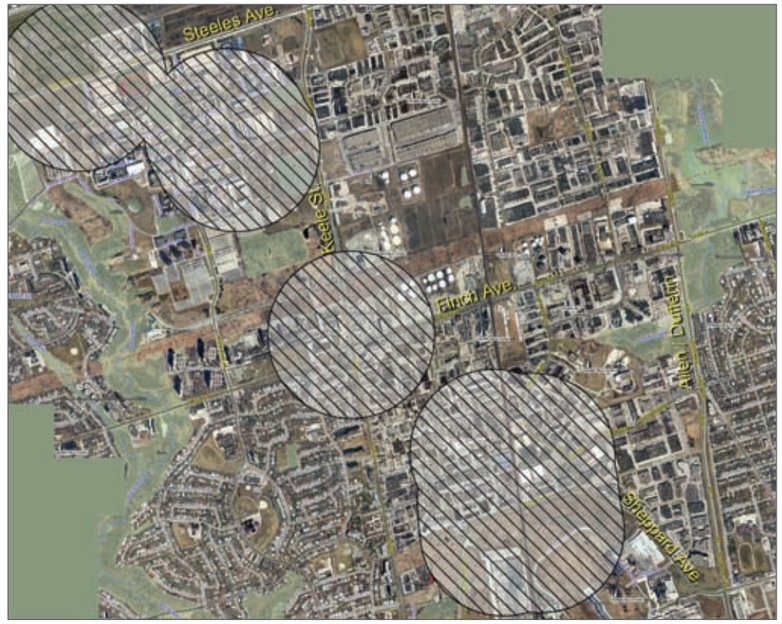
1. ***Establish the "Zones of Influence"*** - Maps 1 and 2 identify a range of options for subway alignments and station box locations. The lines on these Maps represent the actual width of these facilities. To carry out planning and urban design analyses, "zones of influence" were established adjacent to the alignments and station locations to assist in understanding the level of impact on stable land uses and the comparative ability to capture lands with identified redevelopment potential. Two zones of influence were utilized:

    - *Subway alignments* - a 100 metre zone on either side of each of the subway alignment options was used as the basis for understanding land use impacts. This zone was used because it was consistent with the zone of influence used in other criteria/indicator evaluations (see Map 3); and,

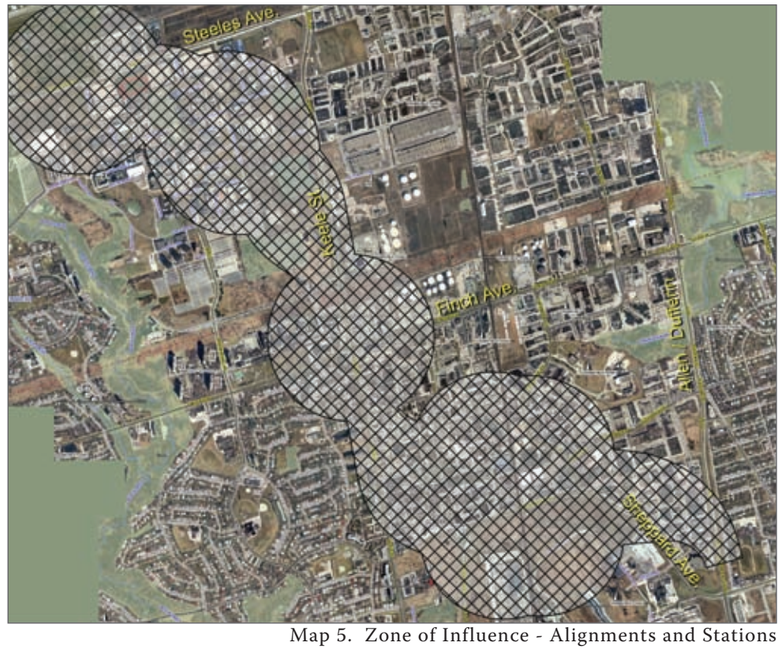
    - *Station locations* - a 500 metre radius from each of the station location options was used to assess the relative level of redevelopment potential captured by each option. This zone is typically used by the TTC and the City of Toronto to evaluate the maximum ridership potential in proximity to subway stations. It represents a walking distance that will attract the highest potential number of transit users from the adjacent community. It is also reasonable to assume that the maximum stimulative impact for redevelopment attributable to the establishment of a subway station would also be within the 500 metre distance of the actual station (see Map 4).

When both zones of influence are combined, it provides a boundary for the preparation of the Development Potential Map. This combined boundary is shown on Map 5.

Map 3. Zone of Influence - Alignments
100m either side of alignment



Map 4. Zone of Influence - Stations
50m radius from station locations



Map 5. Zone of Influence - Alignments and Stations

2. ***Prepare the Development Potential Map*** - Based on the combined zones of influence, an analysis of the relative redevelopment potential of various locations was carried out (see Map 6). This analysis is based partly on existing planning policy and recent planning studies, partly on an understanding of development economics within the area, and partly based on discussions with various major landowners in the area (York University and Parc Downsview Park). Map 6 includes the following categories:

   - *Stable Residential* - this category is intended to recognize existing stable residential neighbourhoods that are not expected to accommodate any significant redevelopment in the long-term. The areas identified on Map 6 are included in the City's new Official Plan as "Stable Residential", and are given a level of protection through planning policy that will make major redevelopment difficult;

   - *Stable Employment* - this category is intended to recognize the existing Downsview industrial area. While the existing employment generating land uses are expected to evolve over time, major redevelopment is not anticipated, even in the long-term. The area is stable, and is functioning economically, both of these factors mitigate against substantial redevelopment. In addition, the City's new Official Plan provides this employment area with protection against the introduction of non-employment generating land uses;

   - *Redevelopable* - this category identifies areas that are either recognized in various planning studies for urban redevelopment - Vaughan Official Plan Amendment 620, the Keele Street Redevelopment Study or the new City of Toronto Official Plan designation for "Avenues"; or, for the lands located adjacent to Sheppard Avenue, they are considered redevelopable because they are at the edge of a stable employment area, which are typically more susceptible to redevelopment than internal sites, or are part of Parc Downsview Park, which, in the long-term, is expected to stimulate redevelopment potential in association with park development and investment in the subway system.

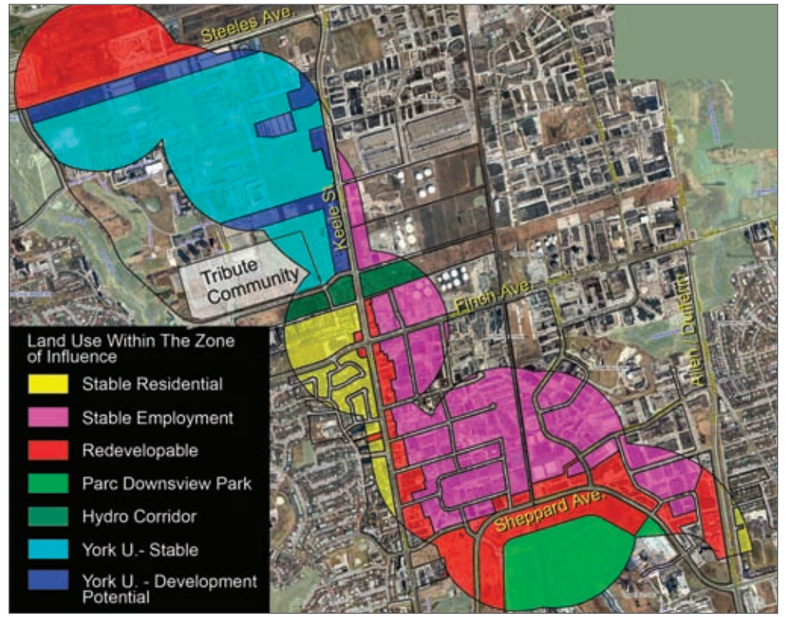
     To be considered as "Redevelopable", the areas had to have direct frontage on the major road network (Sheppard Avenue, Allen Road/Dufferin Street, Keele Street or Steeles Avenue) and have a minimum lot depth of 50 metres, which is a depth that can support significant urban redevelopment. These areas identified as "Redevelopable" are considered the key areas where substantial urban redevelopment has the potential to occur, and can be stimulated by the development of a subway station;

   - *Parc Downsview Park* - this category identifies lands controlled by the federal government (either Parc Downsview Park or the Department of National Defence) that are expected to be used for park or for DND purposes. These lands are not expected to have any substantial redevelopment potential in the long-term;

   - *Hydro Corridor* - this category identifies lands that are currently used as Hydro Corridors. There are two east west Hydro Corridors, one at the South end of York University, north of Finch Avenue, the other north of Steeles Avenue. These lands may be used for transit related facilities but have no redevelopment potential for urban land uses in the long-term;

   - *York University - Stable* - this category identifies lands that are part of the York University campus that are already developed and considered stable including the existing academic core, the built and approved Tribute Community and the existing, protected woodlots; and,

   - *York University - Development Potential* - this category identifies lands that are part of the York University campus that have identified redevelopment potential.



Map 6. Development Potential within the Alignment and Station Zone of Influence

2.2 Land Area, Road Right of Way and Property Calculations

Following the preparation of Map 6, detailed calculations were carried out within the zones of influence for both the 11 alignment options (8 in the south and 3 in the north) and the 14 station location options (8 in the south and 6 in the north). These analyses produced two tables, summarizing the various calculations:

Table 2.1: Land Use Evaluation - Alignments - includes the following calculations for each alignment option:

- the amount of Redevelopable Land encumbered by transit facilities;
- the number of individual properties that are directly impacted by the alignment;
- the length of road right-of-way utilized by the alignment, either public road right-of-way, or the right-of-way of roads on the York University Campus;
- the amount of Stable Residential Land within the zone of influence;
- the amount of Stable Employment Land within the zone of influence;
- the number of buildings directly impacted on the York University Campus; and,
- the amount of stable, developed area on the York University Campus.

Table 2.2: Land Use Evaluation - Stations - includes the following calculations for each alignment option:

- the amount of Redevelopable Land within the zone of influence;
- the length of redevelopable road frontage captured within the zone of influence;
- the amount of York University Land considered redevelopable within the zone of influence; and,
- the length of Redevelopment frontage on York University lands.

Land Use Evaluation - Alignments

	SOUTH ALIGNMENTS								NORTH ALIGNMENTS		
Measures	**S1-West**	**S1-East**	**S2-West**	**S2-East**	**S3-West**	**S3-East**	**S4-West**	**S4-East**	**N1**	**N2**	**N3**
• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	350	330	810	700	730	650	170	170	170	190	240
• Number of individual properties directly impacted. Objective is to minimize.	19	25	20	28	38	31	38	38	3	1	1
• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,280	980	1,280	1,050	1,130	920	540	540	1,260	730	480
• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	9.68	7.44	9.99	8.12	8.52	6.79	5.12	5.12	-	-	-
• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	7.59	12.10	15.15	18.75	24.21	26.80	36.18	36.18	0.03	5.85	4.80
• Number of buildings directly impacted on the York University campus. Objective is to minimize.	-	-	-	-	-	-	-	-	0	2	6
• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	-	-	-	-	-	-	-	-	4.01	4.06	4.48

Table 2.1. Land Use Evaluation - Alignments

Land Use Evaluation - Stations

	SOUTH STATIONS								NORTH STATIONS					
Measures	**S1-West**	**S1-East**	**S2-West**	**S2-East**	**S3-West**	**S3-East**	**S4-West**	**S4-East**	**N1-Steeles W**	**N1-York University**	**N2-Steeles W**	**N2-York University**	**N3-Steeles W**	**N3-York University**
• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	28.24	26.22	25.95	25.36	22.55	23.44	10.60	17.69	22.23	0	21.29	0	20.40	0
• Length of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	2,210	2,170	2,080	2,040	1,900	1,920	1,240	1,480	-	-	-	-	-	-
• Amount of area identified with Redevelopment potential on York University lands (ha). Objective is to maximize.	-	-	-	-	-	-	-	-	9.82	11.81	9.45	6.70	9.45	11.81
• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	-	-	-	-	-	-	-	-	1,000	1,360	1,000	520	1,000	1,360

Table 2.2. Land Use Evaluation - Stations

2.3 Evaluation Indicators and Measures

This land use planning and urban design analysis provides input into the following indicators and related measures:

- ***Indicator B3.1**: Number, type and sensitivity of significant environmental features potentially affected by a future subway extension into York Region.*

  ***Measure:** Compatibility with planned land use.*
  - minimize areas identified Stable Residential lands and Stable Employment lands within the zone of influence;
  - maximize area identified as Redevelopment within zone of influence;
  - maximize Redevelopable Frontage within zone of influence; and,
  - evaluate areas with redevelopment potential and those to be protected from impact on lands identified as York University - Stable.

  It is important to note that this indicator is only applicable to the 3 north alignments and to the Steeles West station options. It is expected that transit facilities and alignment options will impact future development potential along the Steeles corridor. It is a basic principle of this assessment that where development is encumbered by a subway station, an underground alignment or by at-grade transit facilities construction becomes more complex, more costly and subsequently less likely. As such, the options that minimize any impediments to development are preferred.

- ***Indicator C1.1:** Ability to combine stations and transit facilities with the existing and future built form.*

  ***Measure:** Assess the potential for redevelopment and the types of built form.*
  - maximize area identified as Redevelopment or York University - Development Potential within zone of influence;
  - minimize area identified as Redevelopment encumbered by at-grade or below grade transit facilities;
  - maximize Redevelopable Frontage within zone of influence; and,
  - minimize amount of Redevelopment Frontage encumbered by at-grade or below grade transit facilities.

  Urban redevelopment requires exposure to major streets. In this analysis, it is assumed that frontage along major streets (Sheppard, Allen/Dufferin, Finch, Keele and Steeles) captured in the zone of influence has a greater likelihood of redevelopment. However, development frontage that is encumbered by the subway alignment or any at-grade transit facilities may result in prohibitive development costs and delay or obviate redevelopment. Therefore if the subway alignment or any at-grade transit facility encumbers street frontage, redevelopment opportunities will be more difficult to achieve.

- ***Indicator D4.1:** Number, type and sensitivity of residences, businesses and community/recreational/institutional facilities located within alignment and station footprint areas.*

  ***Measure:** The number of individual properties that are directly impacted by the alignment.*
  - minimize the number of individual properties directly impacted by the alignment/station footprint; and,
  - maximize the amount of alignment and station footprint built under existing road right-of-ways.

  The actual footprint of the alignments and the station locations have the potential to create the greatest impact to stable lands uses and development potential and must be considered separately from the zone of influence's impact evaluation. Generally the alignments and the station location options attempt to avoid sensitive land uses, however some options have a greater impact on stable employment lands than others.

- ***Indicator D4.2**: Area, type and sensitivity of residences, businesses and community/recreational/institutional facilities located within adjacent zones of influence.*

  ***Measure:** Ability to minimize the impact on existing stable residential/employment lands within the zone of influence.*
  - minimize areas identified Stable Residential and Stable Employment lands within zone of influence; and,
  - evaluate areas to be protected from impact on lands identified as York University - Stable.

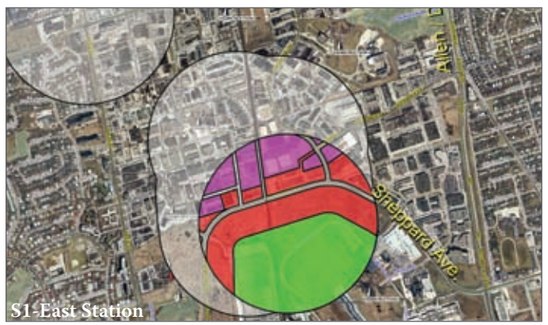
  The zone of influence encompasses the area that may be affected by the alignments and station location options. It is not implied that the lands captured in this zone of influence are necessarily negatively affected, yet the potential for impact is recognized and therefore the options that minimize the inclusion of stable land uses are generally preferred.

3.0 Alignment and Station Location Evaluation

S1-West

S1-West Station

S1-East



S1-East Station

3.0 ALIGNMENT AND STATION LOCATION EVALUATION

3.1 South Alignment & Station Location Options

South 1

Evaluation of South 1 Options

Indicator	Measures	ALIGNMENTS S1-West	ALIGNMENTS S1-East	STATIONS S1-West	STATIONS S1-East
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*				
	• Amount of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	350	330	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*				
	• Number of individual properties directly impacted. Objective is to minimize.	19	25	-	-
	• Amount of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,280	980	-	-
D4.2 Area, type and sensitivity of residences businesses and community/recreational/ institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*				
	• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	9.68	7.44	-	-
	• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	7.58	12.10	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built for anticipated*				
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	-	28.24	26.22
	• Amount of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	-	-	2,210	2,170

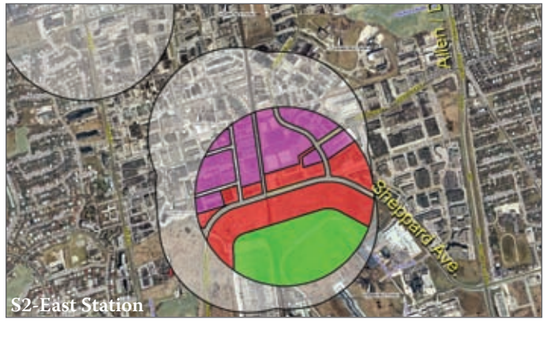
Table 3.1. Alignment & Station Location Options Evaluation - South 1

S1-West

This alignment option enters Parc Downsview Park (PDP) quite southerly and extends northwest into the corner of the employment lands and then onto Keele Street at LePage Court. The west station is located west of the rail tracks on the northwest corner of PDP, which changes the extending alignment westerly. This alignment further avoids protected employment lands from the zone of influence, however it does include more of the existing, stable high-rise residential areas.

S1-East

The S1-East alignment is very similar to S1-West. The primary difference is the location of the station on the east side of the railroad track on PDP lands at the end of the existing runway. A large portion of the zone of influence includes PDP, which supports the redevelopment of these lands, while avoiding the stable employment lands to the north. The alignment's zone of influence includes frontage redevelopment opportunities along Allen, Sheppard, Finch and Keele. The station is off-set from the Sheppard Avenue right-of-way and allows the street frontage to remain open to redevelopment opportunities.



South 2

Evaluation of South 2 Options

Indicator	Measures	ALIGNMENTS S2-West	ALIGNMENTS S2-East	STATIONS S2-West	STATIONS S2-East
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*				
	• Amount of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	810	700	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*				
	• Number of individual properties directly impacted. Objective is to minimize.	20	28	-	-
	• Amount of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,280	1,050	-	-
D4.2 Area, type and sensitivity of residences businesses and community/recreational/ institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*				
	• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	9.99	8.12	-	-
	• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	15.15	18.75	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built for anticipated*				
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	-	25.95	25.36
	• Amount of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	-	-	2,080	2,040

Table 3.2. Alignment & Station Location Options Evaluation - South 2

S2-West

Options S2 and S3 are very similar, the difference being that the station is either fronting on the south side or the north side of Sheppard. The initial preference is to have as much of the line on PDP lands, as this land is considered redevelopable and is generally vacant of buildings. The location of the station fronting on the PDP lands promotes the redevelopment of the entire site; however, the station's proximity to the street also potentially removes that land from the available developable frontage or, at least makes the frontage lands more difficult to develop. The west station location option includes less of the stable employment lands and more of the Keele Street right-of-way, both of which are positive attributes.

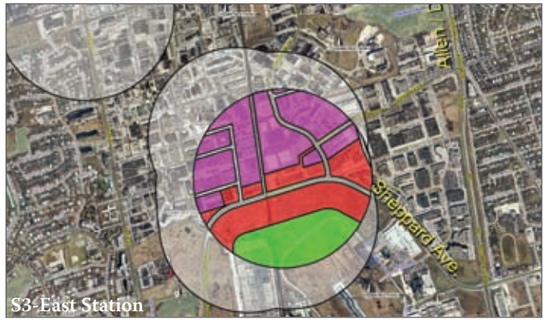
S2-East

As noted, Options S2 and S3 are very similar, the difference being that the station is either fronting on the south side or the north side of Sheppard. The initial preference is to have as much of the line on PDP lands, as this land is considered redevelopable in the long-term and is generally vacant of buildings. The station location on the PDP lands promotes the redevelopment of the entire site; however, the station's proximity to the street also potentially removes that land from the available developable frontage or, at least makes the frontage land more difficult to develop. The east options, including S2-East, include more stable employment lands and less of the Keele Street right-of-way, both of which are negative characteristics.

S3-West

S3-West Station

S3-East



S3-East Station

South 3

Evaluation of South 3 Options

Indicator	Measures	ALIGNMENTS S3-West	ALIGNMENTS S3-East	STATIONS S3-West	STATIONS S3-East
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*				
	• Amount of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	730	650	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*				
	• Number of individual properties directly impacted. Objective is to minimize.	38	31	-	-
	• Amount of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,130	920	-	-
D4.2 Area, type and sensitivity of residences businesses and community/recreational/ institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*				
	• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	8.52	6.79	-	-
	• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	24.21	26.80	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built for anticipated*				
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	-	22.55	23.44
	• Amount of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	-	-	1,900	1,920

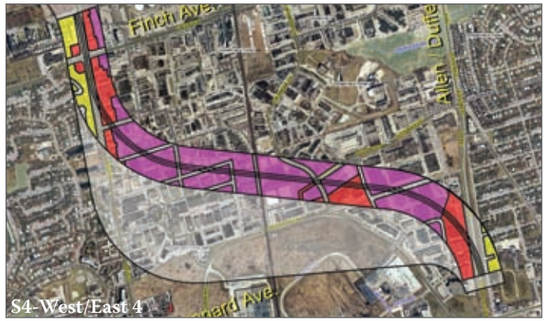
Table 3.3. Alignment & Station Location Options Evaluation - South 3

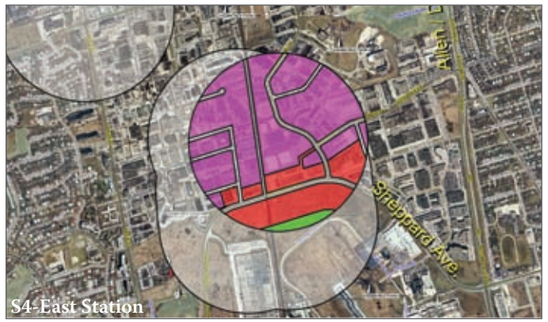
S3-West

As noted, Options S2 and S3 are very similar, the difference being that the station is either fronting on the south side or the north side of Sheppard. The S3-West alignment is on redevelopment lands north of Sheppard. The line is set back from the street edge and leaves a developable block between the line and Sheppard allowing frontage development. The station is west of the rail tracks. The S3-W option includes comparatively less stable employment lands and more of the Keele Street right-of-way than the S3-East alignment, both of which are positive attributes.

S3-East

As noted, Options S2 and S3 are very similar, the difference being that the station is either fronting on the south side or the north side of Sheppard. The S3-East alignment is on lands with redevelopment potential north of Sheppard. The line is set back from the street edge and leaves a developable block between the line and Sheppard allowing frontage development. The station is east of the rail tracks, and includes comparatively more stable employment lands, and utilizes less public road right-of-way, both of which are negative characteristics.





South 4

Evaluation of South 4 Options

Indicator	Measures	ALIGNMENTS S4-West	ALIGNMENTS S4-East	STATIONS S4-West	STATIONS S4-East
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*				
	• Amount of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	170	170	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*				
	• Number of individual properties directly impacted. Objective is to minimize.	38	38	-	-
	• Amount of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	540	540	-	-
D4.2 Area, type and sensitivity of residences businesses and community/recreational/ institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*				
	• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	5.12	5.12	-	-
	• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	36.18	36.18	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built for anticipated*				
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	-	10.60	17.69
	• Amount of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	-	-	1,240	1,480

Table 3.4. Alignment & Station Location Options Evaluation - South 4

S4-West + East

The east and west station locations for S4 utilize the same subway alignment. The zone of influence for this alignment is mostly within the stable employment area. There is little foreseeable redevelopment potential in this area. The alignment impacts many properties and minimizes the use of public right-of-way.

Both the S4-West and S4-East alignments and consequent station locations rank relatively poorly.

SOUTH ALIGNMENTS

Measure	S1-WEST	S1-EAST	S2-WEST	S2-EAST	S3-WEST	S3-EAST	S4-WEST	S4-EAST	FINCH WEST
Assess the potential for redevelopment and the types of urban built form anticipated									
• Amount of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	350 Rank 4 Medium	330 Rank 3 High	810 Rank 8 Low	700 Rank 6 Low	730 Rank 7 Low	650 Rank 5 Medium	170 Rank 1 High	170 Rank 1 High	n/a n/a n/a
The number of individual properties that are directly impacted by the alignment									
• Number of individual properties directly impacted. Objective is to minimize.	19 Rank 1 High	25 Rank 3 High	20 Rank 2 High	28 Rank 4 Medium	38 Rank 6 Low	31 Rank 5 Medium	38 Rank 6 Low	38 Rank 6 Low	n/a n/a n/a
• Amount of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,280 Rank 1 High	980 Rank 5 Low	1,280 Rank 1 High	1,050 Rank 4 Medium	1,130 Rank 3 High	920 Rank 6 Medium	540 Rank 7 Low	540 Rank 7 Low	n/a n/a n/a
Ability to minimize the impact on existing stable lands within the zone of influence									
• Amount of area identified as Stable Residential within zone of influence (ha). Objective is to minimize.	9.68 Rank 7 Low	7.44 Rank 4 Medium	9.99 Rank 8 Low	8.12 Rank 5 Medium	8.52 Rank 6 Low	6.79 Rank 3 High	5.12 Rank 1 High	5.12 Rank 1 High	n/a n/a n/a
• Amount of area identified as Stable Employment within zone of influence (ha). Objective is to minimize.	7.58 Rank 1 High	12.10 Rank 2 High	15.15 Rank 3 High	18.75 Rank 4 Medium	24.21 Rank 5 Medium	26.80 Rank 6 Low	36.18 Rank 7 Low	36.18 Rank 7 Low	n/a n/a n/a
TOTAL ADDITION OF RANKINGS	14	17	22	23	27	25	22	22	n/a
RANK	1	2	3	6	8	7	3	3	n/a
PREFERENCE RANKING	High	High	High	Low	Low	Low	High	High	n/a

Table 3.5. Evaluation - South Alignments

SOUTH STATIONS

Measure	S1-WEST	S1-EAST	S2-WEST	S2-EAST	S3-WEST	S3-EAST	S4-WEST	S4-EAST	FINCH WEST
Assess the potential for redevelopment and the types of urban built form anticipated									
• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	28.24 Rank 1 High	26.22 Rank 2 High	25.95 Rank 3 High	25.36 Rank 4 Medium	22.55 Rank 6 Low	23.44 Rank 5 Medium	10.60 Rank 8 Low	17.69 Rank 7 Low	n/a n/a n/a
• Amount of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	2,210 Rank 1 High	2,170 Rank 2 High	2,080 Rank 3 High	2,040 Rank 4 Medium	1,900 Rank 6 Low	1,920 Rank 5 Medium	1,240 Rank 8 Low	1,480 Rank 7 Low	n/a n/a n/a
TOTAL ADDITION OF RANKINGS	2	4	6	8	12	10	16	14	n/a
RANK	1	2	3	4	6	5	8	7	n/a
PREFERENCE RANKING	High	High	High	Medium	Low	Medium	Low	Low	n/a

Table 3.6. Evaluation - South Stations

3.2 South Alignment and Station Option Conclusions

South Alignments:

The evaluation of the Alignments is concerned primarily with the potential for negative impacts within the 200 metre (100 metres on either side of each alignment). The evaluation is comparative, reviewing each alignment against the other alignment in the south. Ranks 1, 2 and 3 result in a "High", Ranks 4 and 5 in a "Medium", and Ranks 6, 7 and 8 in a "Low".

1. The evaluation of the Finch West Station is not included in this table because it is considered common to all alignment options.

2. The S1-West alignment option is the most preferred because it has the lowest overall impact on property and stable land uses.

3. S3-West is the least preferred alignment option because it affects the greatest number of individual properties and has the greatest cumulative impact.

South Stations:

The evaluation of the Stations is concerned primarily with the potential for redevelopment within the 500 metre radius of each station location. The evaluation is comparative, reviewing each station against the other stations in the south. Ranks 1, 2 and 3 result in a "High", Ranks 4 and 5 in a "Medium", and Ranks 6, 7 and 8 in a "Low".

1. The evaluation of the Finch West Station is not included in this table because it is considered common to all alignment options.

2. The S1-West station location option is the most preferred because it includes the greatest redevelopment potential, and the greatest redevelopable frontage.

3. S4-West is the least preferred alignment option because it includes the least area identified as redevelopable, and the least amount of redevelopable frontage.

COMBINED EVALUATION - SOUTH ALIGNMENTS AND STATIONS

	S1-WEST	S1-EAST	S2-WEST	S2-EAST	S3-WEST	S3-EAST	S4-WEST	S4-EAST	FINCH WEST
Alignment Evaluation	1 High	2 High	3 High	6 Low	8 Low	7 Low	3 High	3 High	n/a n/a
Station Evaluation	1 High	2 High	3 High	4 Medium	6 Low	5 Medium	8 Low	7 Low	n/a n/a
OVERALL ADDITION OF RANKINGS	2	4	6	10	14	12	11	10	n/a
OVERALL RANK	1	2	3	4	8	7	6	4	n/a
OVERALL PREFERENCE	High	High	High	Medium	Low	Low	Low	Medium	n/a

Table 3.7. Combined Evaluation - South Alignments & Stations

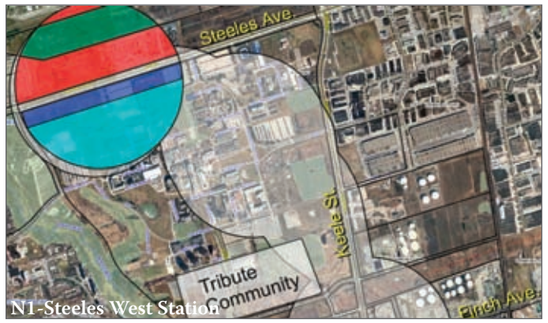
Combined Evaluation

1. S1-West, S1-East and S2-West are preferred, with S1-West identified as the most preferred.

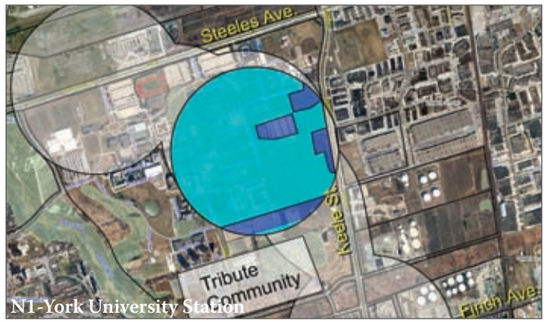
2. S2-East and S4-East are acceptable.

3. S3-West, S3-East and S4-West are not preferred, with S3-West identified as the least preferred.

N1



N1-Steeles West Station



N1-York University Station

3.3 North Alignment & Station Location Options

North 1

Evaluation of North 1 Options

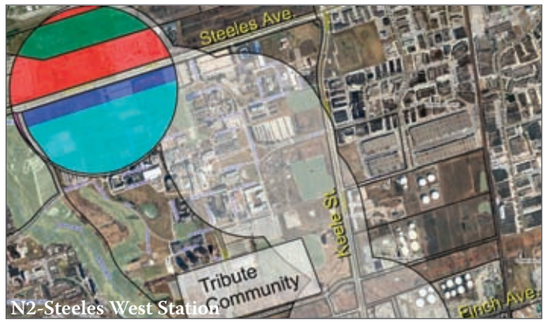
Indicator	Measures	N1	N1- Steeles West Station	N1- York University Station
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	170	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*			
	• Number of individual properties directly impacted. Objective is to minimize.	3	-	-
	• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	1,260	-	-
	• Number of buildings directly impacted on the York University campus. Objective is to minimize.	0	-	-
D4.2 Area, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*			
	• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	40.06	-	-
	• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	0.03	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	22.23	0
	• Amount of area identified with Redevelopment potential on York University lands (ha). Objective is to maximize.	-	9.82	11.81
	• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	-	1,000	1360

Table 3.8. Alignment & Station Location Options Evaluation - North 1

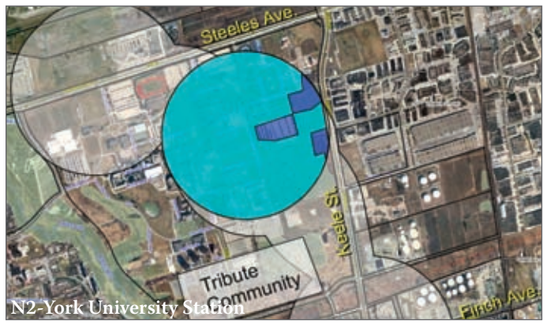
N1

The alignment moves onto the York University lands immediately north of the Hydro Corridor. The footprint of this alignment impacts a proposed residential development (Phase Two of Tribute Communities). In addition, its zone of influence, when extended into York Region has the potential to include a corner of Black Creek Pioneer Village. The York University Station is located at the Commons (north-south). This location provides opportunities to integrate the station entrances and exits into the existing pedestrian patterns of the University. The Steeles West station is located within the Steeles Avenue right-of-way (east-west), which is a positive attribute in consideration of the redevelopment potential along both sides of Steeles.

N2



N2-Steeles West Station



N2-York University Station

North 2

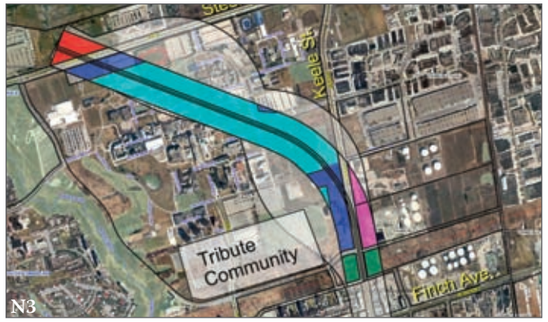
Evaluation of North 2 Options

Indicator	Measures	N1	N1- Steeles West Station	N1- York University Station
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	190	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*			
	• Number of individual properties directly impacted. Objective is to minimize.	1	-	-
	• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	730	-	-
	• Number of buildings directly impacted on the York University campus. Objective is to minimize.	2	-	-
D4.2 Area, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*			
	• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	40.60	-	-
	• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	5.85	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	21.29	0
	• Amount of area identified with Redevelopment potential on York University lands (ha). Objective is to maximize.	-	9.45	6.70
	• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	-	1,000	520

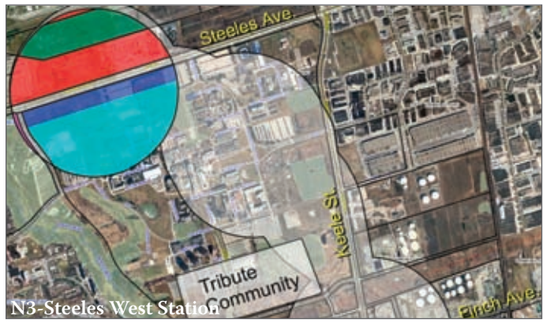
Table 3.9. Alignment & Station Location Options Evaluation - North 2

N2

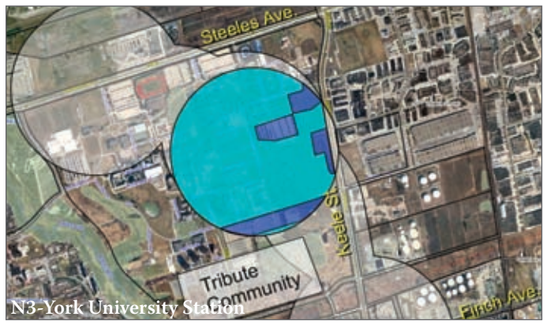
The alignment moves onto the York University lands just after Pond Road. The York University station is located north of the Commons (east-west). This location provides less opportunity to integrate the station entrances and exits with the greenspace hub of the campus and its major pedestrian patterns. The Steeles West station is located mainly on the York University lands in a north-south configuration. The north-south configuration poses potential redevelopment constraints on the Steeles frontage, which is not advantages.



N3



N3-Steeles West Station



N3-York University Station

North 3

Evaluation of North 3 Options

Indicator	Measures	N1	N1- Steeles West Station	N1- York University Station
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	240	-	-
D4.1 Number, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within alignment and station footprint areas	*The number of individual properties that are directly impacted by the alignment*			
	• Number of individual properties directly impacted. Objective is to minimize.	1	-	-
	• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	480	-	-
	• Number of buildings directly impacted on the York University campus. Objective is to minimize.	6	-	-
D4.2 Area, type and sensitivity of residences businesses and community/ recreational/institutional facilities located within adjacent zones of influence	*Ability to minimize the impact on existing stable lands within the zone of influence*			
	• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	44.84	-	-
	• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	4.80	-	-
C1.1 Ability to combine stations and transit facilities with the existing and future built form	*Assess the potential for redevelopment and the types of urban built form anticipated*			
	• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	-	20.40	0
	• Amount of area identified with Redevelopment potential on York University lands (ha). Objective is to maximize.	-	9.45	11.81
	• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	-	1,000	1,360

Table 3.10. Alignment & Station Location Options Evaluation - North 3

N3

The alignment moves onto the York University lands just before Pond Road. The York University Station is located at the Commons (angled east-west). This location provides opportunities to integrate the station entrances and exits with the pedestrian patterns of the University. The Steeles West Station is located mainly on the York University lands in a north-south configuration. The north-south configuration may limit development potential along the Steeles frontage, which is not advantageous.

NORTH ALIGNMENTS

Measure	N1	N2	N3
Assess the potential for redevelopment and the types of urban built form anticipated • Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	170 Rank 1 High	190 Rank 2 Medium	240 Rank 3 Low
The number of individual properties that are directly impacted by the alignment • Number of individual properties directly impacted. Objective is to minimize.	3 Rank 3 Low	1 Rank 1 High	1 Rank 1 High
• Length of station/alignment footprint located under a road ROW (m). Objective is to maximize.	1,260 Rank 1 High	730 Rank 2 Medium	480 Rank 3 Low
• Number of buildings directly impacted on the York University campus. Objective is to minimize.	0 Rank 1 High	2 Rank 2 Medium	6 Rank 3 Low
Ability to minimize the impact on existing stable lands within the zone of influence • Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	40.06 Rank 1 High	40.59 Rank 2 Medium	44.84 Rank 3 Low
• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	0.03 Rank 1 High	5.85 Rank 3 Low	4.80 Rank 2 Medium
TOTAL ADDITION OF RANKINGS **RANK** **PREFERENCE RANKING**	8 1 High	12 2 Medium	15 3 Low

Table 3.11. Evaluation - North Alignment

3.4 North Alignment and Station Option Conclusions

North Alignments

The evaluation of the Alignments is concerned primarily with the potential for negative impacts within the 200 metre (100 metres on either side of each alignment). The evaluation is comparative, reviewing each alignment with other alignments in the north. Rank 1 is "High", Rank 2 is "Medium" and Rank 3 is "Low".

The N1 alignment is the most preferred option because it has the lowest overall impact on redevelopment frontage, number of buildings on York University, stable development area, and stable employment area.

NORTH STATIONS

Measure	N1 Steeles West	N2 - Steeles West	N3 - Steeles West	N1 - York University	N2 - York University	N3 - York University
Assess the potential for redevelopment and the types of urban built form anticipated						
• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	22.23 Rank 1 High	21.29 Rank 2 Medium	20.40 Rank 3 Low	0 Rank 3 Low	0 Rank 3 Low	0 Rank 3 Low
• Amount of area identified with Redevelopment potential on York University lands (ha). Objective is to maximize.	9.82 Rank 1 High	9.45 Rank 2 Medium	9.45 Rank 2 Medium	11.81 Rank 1 High	6.70 Rank 3 Low	11.81 Rank 1 High
• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	1,000 Rank 1 High	1,000 Rank 1 High	1,000 Rank 1 High	1,360 Rank 1 High	520 Rank 3 Low	1,360 Rank 1 High
TOTAL ADDITION OF RANKINGS **RANK** **PREFERENCE RANKING**	3 1 High	5 2 Medium	6 3 Low	5 1 High	9 3 Low	5 1 High

Table 3.12. Evaluation - North Stations

COMBINED EVALUATION - NORTH ALIGNMENTS AND STATIONS

	N1	N2	N3
Alignment Evaluation	1 High	2 Medium	3 Low
Steeles West Evaluation	1 High	2 Medium	3 Low
York University Evaluation	1 High	3 Low	1 High
OVERALL ADDITION OF RANKINGS **OVERALL RANK** **OVERALL PREFERENCE**	3 1 High	7 2 Medium	7 2 Medium

Table 3.13. Combined Evaluation - North Alignments & Stations

North Stations

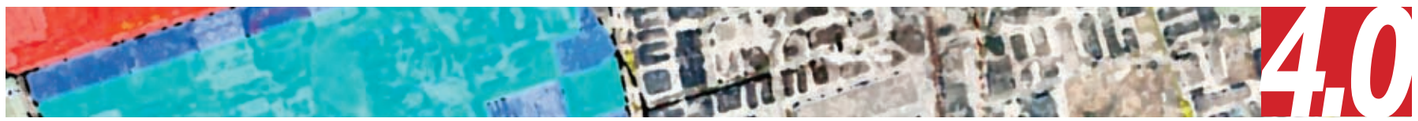
The evaluation of the Stations is concerned primarily with the potential for redevelopment within the 500 metre radius of each station location. The evaluation is comparative, reviewing each station against the other stations in the north. Rank 1 is a "High", 2 a "Medium" and 3 a "Low".

1. The N1 option at Steeles West is the most preferred because it includes the greatest redevelopment potential, and the greatest redevelopable frontage.

2. The N1 and N3 options at York University are equally preferred because they have the same redevelopment potential and redevelopment frontage.

Combined Evaluation

Based on this analysis N1 is most preferred, followed by N2 and N3 having equal preference.



4.0 Bus Terminal Analysis

4.0 BUS TERMINAL ANALYSIS

4.1 Finch West Bus Terminal Options

There are five bus terminal location options for the Finch West station. The subway station platform is under the ROW of Keele and allows for the development of all available frontage without the encumbering cost of building over a subway line.

For each bus terminal option the subway can exit at any or all four corners of Finch and Keele, which supports the development of a pedestrian-oriented transit corridor. As well, all of the options locate the commuter parking and passenger drop-off in the hydro corridor. As a result, the location and configuration of the bus terminal is the primary urban design issue. The objective is to generate opportunities to develop an active street edge and create an enhanced pedestrian realm, therefore options that minimize the amount of Keele and Finch Street frontage dedicated to the bus terminal are considered best. By minimizing the frontage taken by transit facilities other redevelopment opportunities are possible.

Based on this analysis, Options 2, 4 and 5 are equally preferred. The location of the bus terminal in Option 4 impacts the least amount of businesses. Options 2 and 5 present bus terminal configurations that minimize the loss of arterial street frontage and best support a pedestrian orientated urban design. Both options minimize the amount of street frontage that is precluded from development. Option 5 can be developed with virtually all of the street frontage available for building. As a result, Option 5 is the most preferred.

The following Finch West station vignettes provide a visual representation of the design review.

Finch West Bus Terminal Options

Measures	Option 1	Option 2	Option 3	Option 4	Option 5
• Compatibility with planned land use	N/A	N/A	N/A	N/A	N/A
Assess the potential for redevelopment and the types of urban built form anticipated					
• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	125 Rank 3 Medium	70 Rank 2 High	195 Rank 4 Low	195 Rank 4 Low	15 Rank 1 High
• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	All options have equal potential				
• Amount of area identified with University Redevelopment Potential on York University lands (ha). Objective is to maximize.	N/A	N/A	N/A	N/A	N/A
• Length of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	All options have equal redevelopment frontage - 700m				
• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	N/A	N/A	N/A	N/A	N/A
The number of individual properties that are directly impacted by the alignment					
• Number of individual properties directly impacted*. Objective is to minimize.	4 Rank 2 Medium	2 Rank 1 High	5 Rank 4 Low	4 Rank 2 Medium	5 Rank 4 High
• Number of businesses directly impacted**. Objective is to minimize.	35 Rank 5 Low	21 Rank 4 Low	15 Rank 2 Medium	13 Rank 1 High	15 Rank 2 Medium
• Number of buildings directly impacted on the York University campus. Objective is to minimize.	N/A	N/A	N/A	N/A	N/A
• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	N/A	N/A	N/A	N/A	N/A
Ability to minimize the impact on existing stable lands within the zone of influence					
• Area of Stable Residential within zone of influence (ha). Objective is to minimize.	Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.				
• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	N/A	N/A	N/A	N/A	N/A
• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	N/A	N/A	N/A	N/A	N/A
TOTAL ADDITION OF RANKINGS	10	7	10	7	7
RANK	4	1	4	1	1
PREFERENCE RANKING	Low	High	Low	High	High

* includes all properties that the bus terminal encompasses partially or entirely
** includes all businesses on the properties that the bus terminal encompasses partially or entirely

Table 4.1. Finch West Bus Terminal Options

Finch 1

The bus terminal is located north of Finch Avenue fronting Keele Street and Four Winds Drive. This location maximizes proximity to the drop-off and parking areas, yet is still a short walk to the subway and is taking a sizable amount of developable frontage off Keele.

Criteria

C1.1 Option 1 orients the station lengthwise removing 125 metres of Keele frontage from development opportunities and creating a low potential for maximizing development frontage, which would support the best possible pedestrian environment.

D4.1 The station impacts 4 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – Low

Finch 2

The bus terminal is located north of Finch and west of Keele; it is on the interior of the site with limited frontage on Finch.

Criteria

C1.1 There is a small access point off Tangiers Road. The properties fronting the major roads are all deep enough to be redevelopable blocks. This configuration supports the redevelopment of the Keele/Finch intersection and the creation of a pedestrian and transit oriented hub.

D4.1 The station minimally impacts 2 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – High

Finch 3

The bus terminal is located on the southeast corner of Keele and Finch, adjacent to the subway.

Criteria

C1.1 The length of the terminal is fronting Keele while the width of the terminal is fronting Finch, effectively removing a total of 195 metres of developable frontage. This location would severely impede the redevelopment of the corner and the creation of a pedestrian-oriented node. The subway would be directly linked to the terminal, minimizing transfer times as well as above street activity. This southerly location also results in the passenger drop-off/pick-up and the commuter parking to be over a block away from the subway.

D4.1 The station impacts 5 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – Low

Finch 4

The bus terminal is located on the northeast corner of Keele and Finch, adjacent to the subway.

Criteria

C1.1 The length of the terminal is fronting Keele while the width of the terminal is fronting Finch, effectively removing a total of 195 metres of developable frontage. This location would severely impede the redevelopment of the corner and the creation of a pedestrian-oriented node. The subway would be directly linked to the terminal, minimizing transfer times as well as above street activity.

D4.1 The station impacts 4 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – High

Finch 5

The bus terminal is located on south of Finch and west of Keele interior from the major roads.

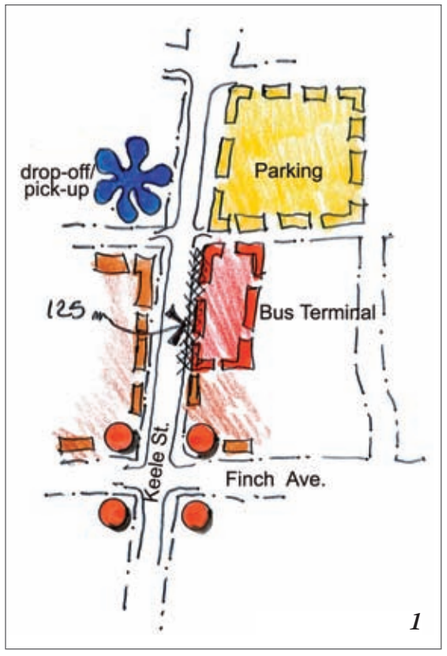
Criteria

C1.1 There is a small access point off of Keele Street through to Tangiers road. The properties fronting the major roads are all deep enough to be redevelopable blocks. This configuration supports the redevelopment of the Keele/Finch intersection and the creation of a pedestrian and transit oriented hub. However, the distance from the passenger drop-off and pick-up is over a block away.

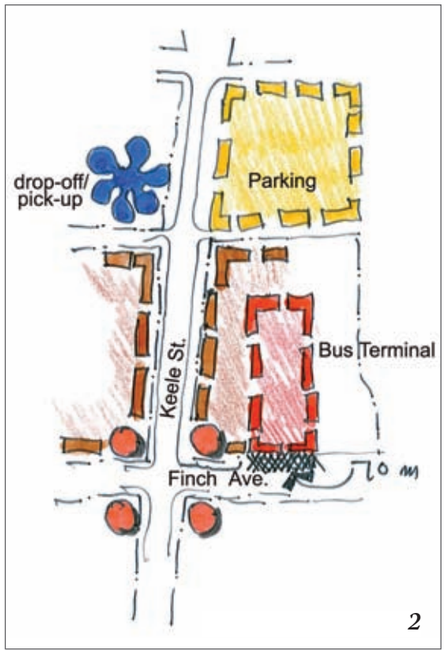
D4.1 The station impacts 5 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

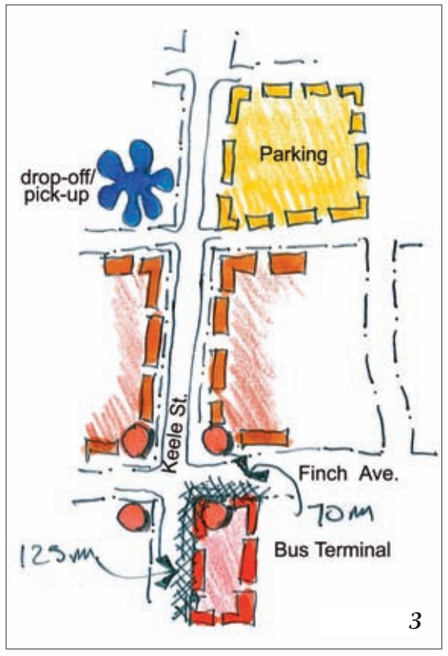
Overall RANK – High



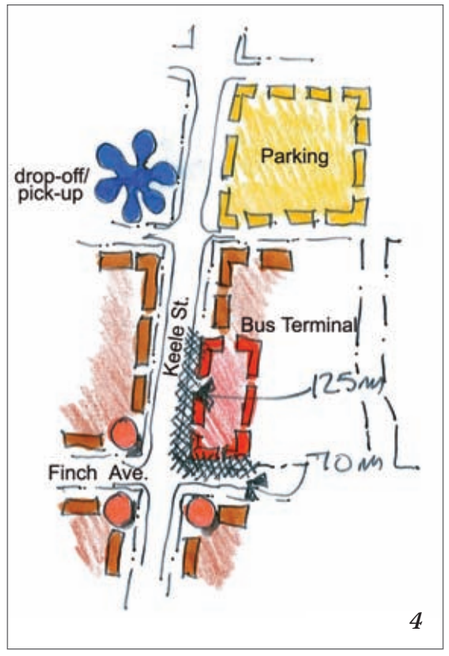
1



2



3



4

5

4.2 Steeles West Station Options

There are four bus terminal location options for the Steeles West station.

The Steeles West station configurations are the result of the scale of the bus terminals required for three converging services [Toronto Transit Commission (TTC), GO Transit and York Regional Transit (YRT)]. The scale and layout of this station will significantly impact the urban design characteristics of the Steeles Corridor. The options that have multiple and dispersed bus terminals have the greatest impact, limiting developable area and frontage.

In each option, subway access points are on both sides of Steeles. The portion of the terminal that fronts on Steeles Avenue West is effectively excluded from development. When the portions of frontage that are excluded from development, the urban design result is a street edge devoid of meaningful development, negatively effecting the pedestrian environment. One of the important urban design objectives is to create a strong street edge providing a comfortable pedestrian environment. The conclusion of this analysis supports options that minimize the impact on street level activity and allow the maximum redevelopment to occur on both sides of Steeles Avenue.

All of the options locate commuter parking in the hydro corridor. As a terminus station the commuter parking requirement is expected to be substantial; however, since it is a constant in each option and the parking will be screened by the bus terminal and buildings fronting Steeles, the lots impact on the urban design is not part of the this evaluation. The passenger drop-off/pick-up is usually located in the Hydro corridor, expect for Option 2, which locates it south of Steeles on York University lands. Therefore, the bus terminal location and configuration becomes the overriding urban design determinant.

The following Steeles West station vignettes provide a visual representation of the design review.

Steeles West Bus Terminal Options

Measures	**Option 1A**	**Option 1B**	**Option 2**	**Option 3**
• Compatibility with planned land use	Promotes suburban development form Rank 3 Low	Promotes suburban development form Rank 3 Low	Generally supports urban development Rank 2 Medium	Supports most urban form of development Rank 1 High
Assess the potential for redevelopment and the types of urban built form anticipated				
• Length of Redevelopment Frontage encumbered by transit facilities (m). Objective is to minimize.	290 Rank 3 Low	290 Rank 3 Low	90 Rank 1 High	90 Rank 1 High
• Amount of area identified as Redevelopment within zone of influence (ha). Objective is to maximize.	All options have equal potential			
• Amount of area identified with University Redevelopment Potential on York University lands (ha). Objective is to maximize.	All options have equal potential			
• Length of Redevelopment Frontage within zone of influence (m). Objective is to maximize.	All options have equal redevelopment frontage - 400m			
• Length of Redevelopment Frontage on York University lands (m). Objective is to maximize.	All options have equal redevelopment frontage - 400m			
The number of individual properties that are directly impacted by the alignment				
• Number of individual properties directly impacted. Objective is to minimize.	4 Rank 3 Low	4 Rank 3 Low	3 Rank 2 Medium	2 Rank 1 High
• Number of buildings directly impacted on the York University campus. Objective is to minimize.	N/A	N/A	N/A	N/A
• Length of station/ alignment footprint located under a road ROW (m). Objective is to maximize.	N/A	N/A	N/A	N/A
Ability to minimize the impact on existing stable lands within the zone of influence				
• Area of Stable Residential within zone of influence (ha). Objective is to minimize.	Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.			
• Area of Stable Development on the York University Campus within zone of influence (ha). Objective is to minimize.	N/A	N/A	N/A	N/A
• Area of Stable Employment within zone of influence (ha). Objective is to minimize.	N/A	N/A	N/A	N/A
TOTAL ADDITION OF RANKINGS	9	9	5	3
RANK	3	3	2	1
PREFERENCE RANKING	Low	Low	Medium	High

Table 4.2. Steeles West Bus Terminal Options

Steeles 1a

The bus terminal consists of two buildings, a large terminal to the north west of the access road and a smaller terminal on York University lands east of the campus entrance.

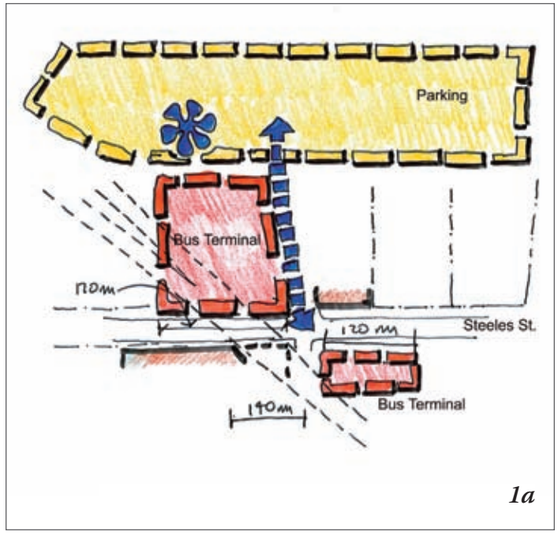
Criteria

C1.1 The three terminals take a total of 290 metres of frontage on Steeles Avenue. The bus terminal location significantly impacts the ability of Steeles to support street level activity and the creation of a pedestrian oriented environment, which are the planning and urban design goals of the City of Toronto, York Region and City of Vaughan.

D4.1 The station minimally impacts 2 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – Low



1a

Steeles 1b

The bus terminal consists of three buildings, two medium sized terminals on the north side of Steeles flanking the proposed access road, and a smaller terminal on York University lands east of the campus entrance.

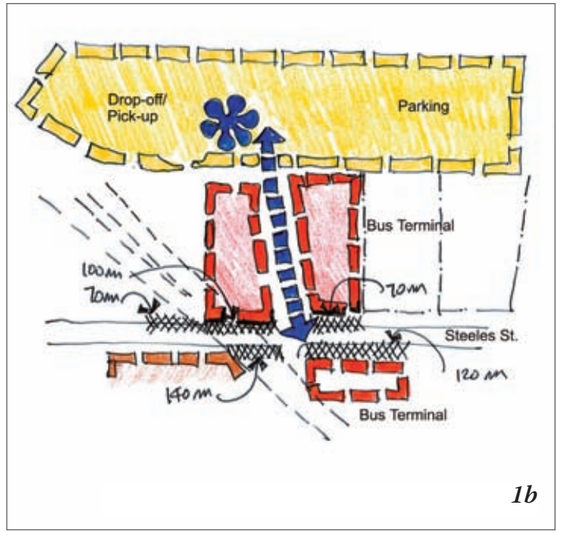
Criteria

C1.1 The three terminals take a total of 290 metres of frontage from the redevelopment of Steeles Avenue. The station location significantly impacts the ability of Steeles to support street level activity and the creation of a pedestrian oriented environment, which are the planning and urban design goals of the City of Toronto, York Region and City of Vaughan. In addition, the stations occupy three of the four corners of an important intersection. When combined with the impact of the alignment on the remaining corner (NW), the subway intersection does not offer and redevelopment adjacent to the TTC Station. The two terminals flanking the proposed road remove any redevelopment potential along that road and create a greater impact than the single large terminal of option 1a.

D4.1 The station minimally impacts 2 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – Low



1b

Steeles 2

The bus terminal consists of two buildings on the north side of Steeles. One building is fronting Steeles, the second build is linear and uses the length of the Hydro Corridor. The passenger drop-off and pick-up is located on the south side of Steeles in a proposed parking lot.

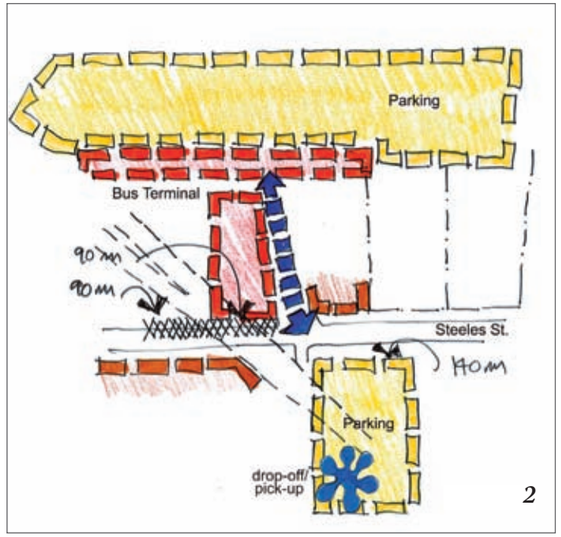
Criteria

C1.1 The linear configuration of the main terminal leaves a maximum amount of Steeles frontage for redevelopment taking only 90 metres for the bus terminal.

D4.1 The station minimally impacts 2 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – Medium



2

Steeles 3

The bus terminal is a multi-storey building fronting the north side of Steeles.

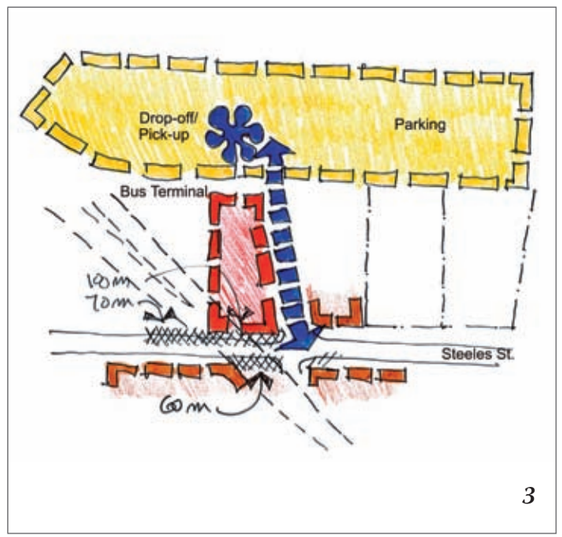
Criteria

C1.1 The stacked bus terminal minimize the building footprint maximizing the redevelopable and frontage area on Steeles Avenue, taking only 90 metres for the bus terminal. The stacked terminal also allows transfer passengers a quicker exchange.

D4.1 The station impacts 3 properties.

D4.2 Due to the redevelopment potential and ownership structure, impact on stable residential lands is not considered relevant.

Overall RANK – High



3