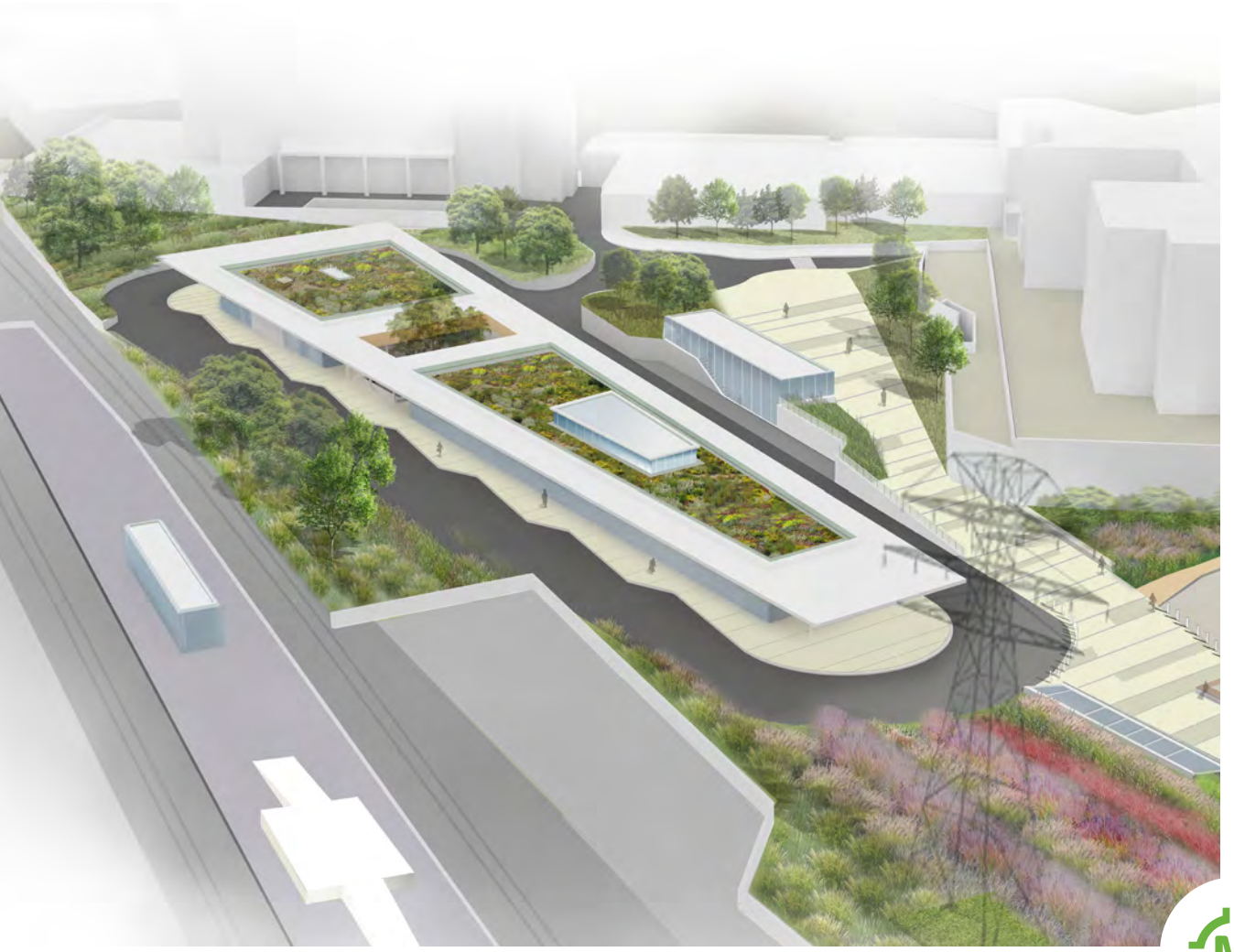
Kipling Bus Terminal Feasibility Study



METROLINX

February 2015

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The Kipling Bus Terminal Feasibility Study was prepared by:

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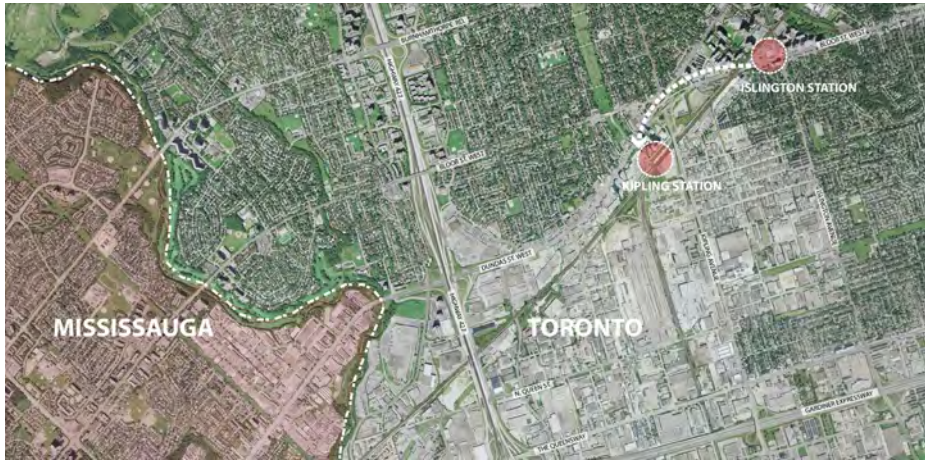
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EXECUTIVE SUMMARY

Kipling Station is located within the City of Toronto, along GO Transit's Milton line, and at the terminus of the TTC Bloor-Danforth subway line (Line 2). Miway buses, originating from the City of Mississauga to the west, currently terminate at Islington subway station, approximately 1.4km to the east. The existing bus terminal at Islington Station suffers from extensive deferred maintenance, is not universally accessible, and needs to be replaced. The opportunity exists to relocate this bus terminal to a new integrated facility at Kipling Station.



Travel distances for MiWay buses will be reduced by 1.4 km.

Municipal and Provincial planning policies envision the area around Kipling Station developing into a mixed-use centre that is well served by transit options. The Growth Plan for the Golden Horseshoe designates the surrounding area - Etobicoke Centre - as an Urban Growth Centre, while The Big Move designates Kipling Station as a Mobility Hub. Work has recently started on the Six Points Interchange Reconfiguration to the immediate east of the station - a project that will see the 16 acre interchange reconfigured into a mixed-use, transit-oriented development. Significant private sector development is planned to the west of the station, along Dundas Street West.

The study area includes the existing Kipling TTC and GO stations, the north and west commuter parking lots, the existing Passenger Pick-up and Drop-off (PPUDO), as well as the south parking lot, south of the CP Rail corridor. The site is limited by a number of constraints that include:

- Fragmented land ownership;
- Restrictions and easements in favour of Hydro One that limit the location and type of structures that can be implemented;
- Sloping grades; and
- Irregular shaped lots.

The Feasibility Study is intended to:

- Develop a plan for the new bus terminal and related changes to roads, sidewalks, parking lots, and landscaping;



Study Area Context

- Identify improvements to pedestrian and cycling access to various transit modes across the station area and;
- Implement changes to the Kipling GO Station to meet requirements of the Accessibility for Ontarians with Disabilities Act (AODA).

The Feasibility Study was informed by a Technical Advisory Committee (TAC) that included representatives from the City of Toronto, MiWay, GO Transit, the TTC and Hydro One. The design team, together with the TAC developed the following priorities, that guided the design of the new bus terminal:

1. Bus Terminal
2. Pedestrian Access
3. Bus Access
4. Cyclist Access
5. Placemaking
6. PPUDO + Taxis
7. Commuter Parking
8. Development Potential
9. Subway Extension

A long list of site plan options were prepared, reviewed with the Technical Advisory Committee (TAC) and evaluated against the priorities noted above. From this list, a pair of site plan options were selected for more detailed development and analysis. These options are illustrated to the right.

These options were again reviewed with the TAC and the local community and evaluated against the priorities. Option 1 was selected, and was then further developed into the Preferred Station Area Plan.



Option 1 Station Area Plan



Option 2 Station Area Plan

The Preferred Station Area Plan's features include:

Transit Facilities

- 14 bay bus terminal with dedicated access off of Subway Crescent;
- New station entrance building at the base of Subway Crescent;
- Fully accessible, pedestrian tunnels connecting the new bus terminal with the GO Station platform and existing Kipling subway station; and
- New, accessible 'mini platform' on the GO train platform.

Access and Circulation

- New intersection at Acorn Avenue serving commuter parking and PPUDO;
- Grade-separated cycle-tracks and pedestrian walkways on both sides of the new Acorn Avenue driveway;
- Reorganized and expanded PPUDO facility;
- Expanded taxi stand;
- Reorganized commuter parking facilities that provide 230 spots accessed via the new Acorn Avenue intersection; and
- Alternate bus access routes that permit emergency movement between the new and existing bus terminals, and each of the three signalized intersections along Dundas Avenue West.
- Main east-west pedestrian walkway connecting bus terminal to existing TTC station;

Architecture

- Passenger Building containing: designated waiting area, ticket booth, retail space, public washrooms and connection to pedestrian tunnels;
- Service Building containing: staff washrooms and lunch rooms for both GO and MiWay staff, mechanical and electrical rooms, the snow-melt boiler room, and a dispatch office;
- Single large roof canopy connecting the Passenger and Service Buildings, and providing cover over the extent of the bus platform; and
- Accessibility upgrades to the existing GO Station building.



Proposed Bus Terminal - Exterior View at the Garden Looking East



Preferred Station Area Plan: Bus and Automobile Routes

Public Realm and Landscape Design

- New Transit Plaza with improved pedestrian and bike access located at main PPUDO facility;
- Storm-water management mitigation facilities throughout the surface parking lots;
- Native and low-maintenance plantings located throughout the site;
- Planted berms, terraces and slopes at areas of grade changes;
- Green roof on the bus terminal; and
- Bus terminal garden courtyard.

The Feasibility Study includes an Implementation Strategy that outlines necessary approvals, next steps and phasing. This work includes:

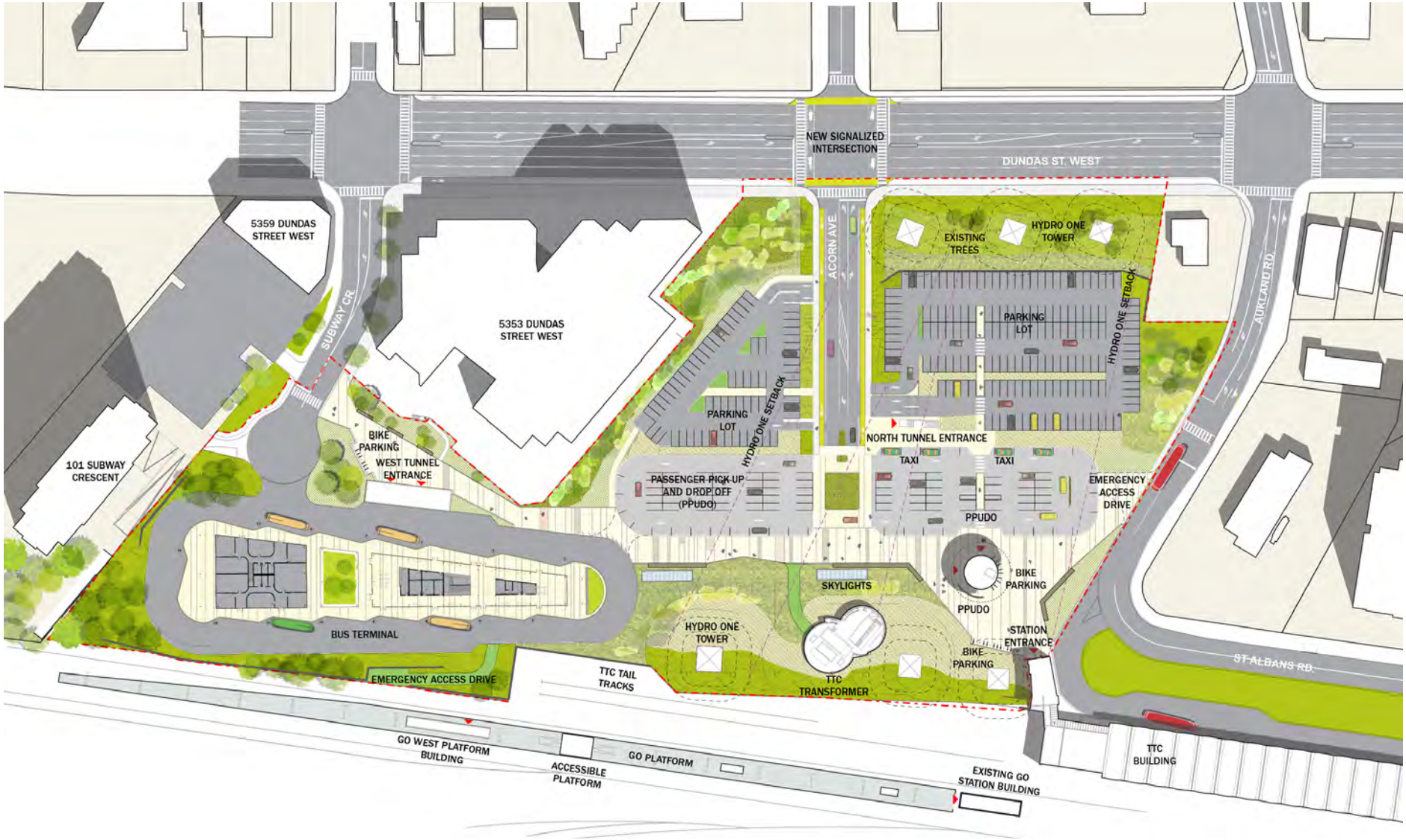
- Preparation of detailed design drawings and specifications for tender;
- Additional site investigations and surveys;
- Additional approvals from Hydro One, CP Rail, the TTC, MiWay and the City of Toronto;
- Municipal road closure process for Subway Crescent;
- Preparation of operational agreements; and
- Negotiation of required land transfers and/or easement agreements.



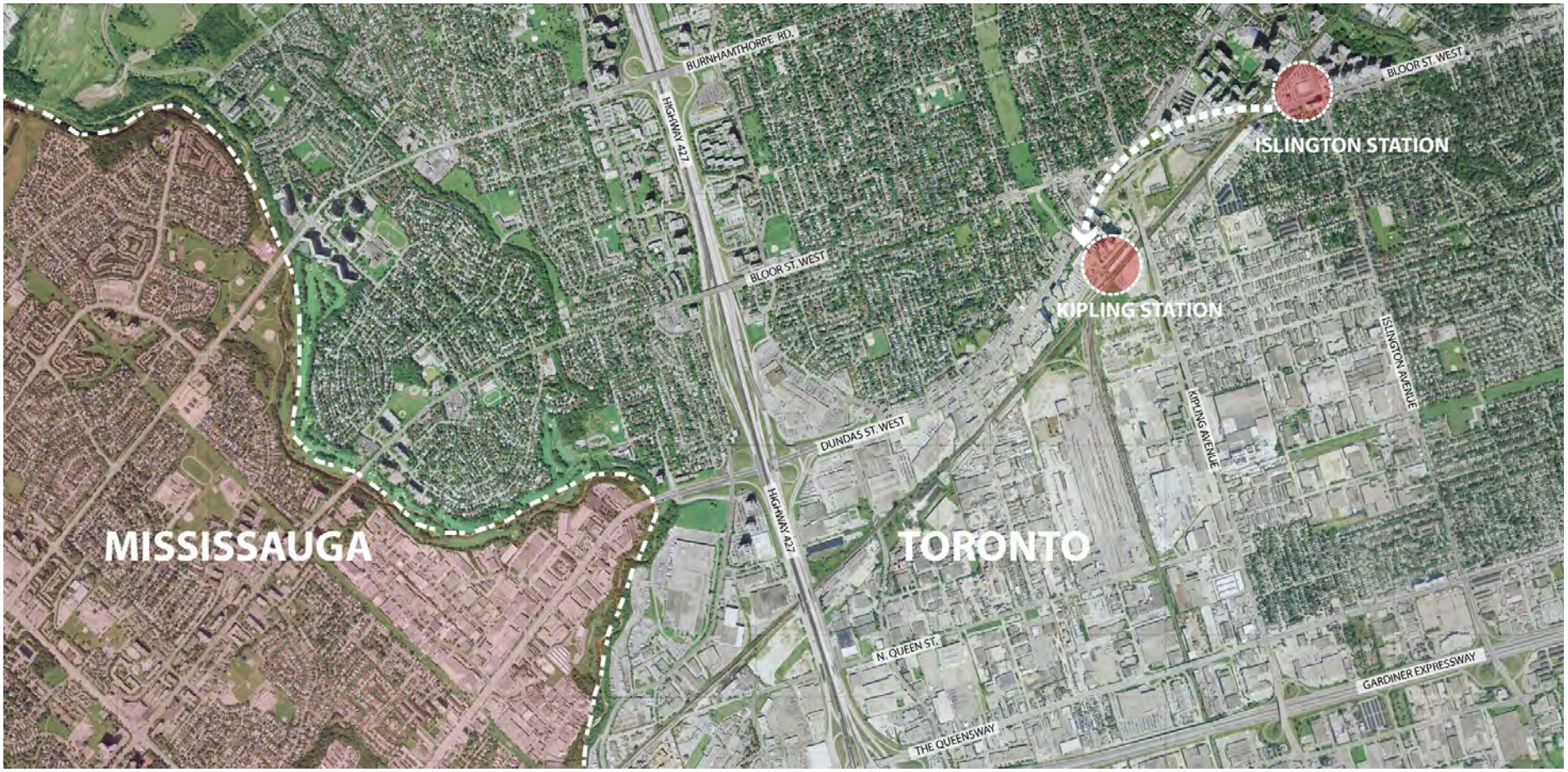
Proposed PPUDO View Looking Southwest



Proposed Aerial View of Bus Terminal and Parking Lot, Looking Northwest



PREFERRED STATION AREA PLAN



Travel distances for MiWay buses will be reduced by 1.4 km.





Existing Islington Bus Terminal

1.0 INTRODUCTION

1.1 OVERVIEW

The purpose of the Kipling Bus Terminal Feasibility Study is to recommend a preferred preliminary design for the bus terminal and determine how the station area will work and look in the short- to medium-term (five to 15 years).

The study focuses on:

- The new bus terminal layout and related changes to roads, sidewalks, parking lots, and landscaping;
- Improved pedestrian and cycling access to various transit modes across the station area and;
- Proposed changes to the Kipling GO Station to meet requirements of the Accessibility for Ontarians with Disabilities Act (AODA).

Bus Terminal Need

At Kipling Station, a new inter-regional bus terminal is proposed to accommodate Mississauga Transit (MiWay) buses that are currently using the Islington Station bus terminal, and potentially, new GO Transit bus routes. The existing TTC bus terminal at Kipling Station will not be changed and the TTC will continue operating it.

MiWay buses currently face a number of challenges at Islington Station:

- Congestion due to insufficient platforms and layover space
- Inadequate maneuverability for buses.
- Not compliant with current accessibility standards.
- Inadequate customer and staff amenities.
- Frequent closures due to infrastructure issues.
- Lack of alternate entrance/exit routes in case of emergencies.
- Structural deterioration of concrete bus terminal canopies.

A new Kipling bus terminal will reduce travel distances for MiWay buses; provide better connections between TTC, MiWay and GO Transit; and enable the TTC to rebuild the Islington bus terminal to provide full accessibility and increased redevelopment potential at that station.

1.2 PREVIOUS BUS TERMINAL STUDIES

There have been discussions since 1980, when the subway was extended to Kipling Station, about moving the bus terminal from Islington Station. Building a bus terminal for MiWay at Kipling Station has been proposed in more detail since 2003.

Metrolinx developed a design concept in 2009-2010, as part of the Kipling Mobility Hub Design Concept Development Study, by planningAlliance, that located the bus terminal under the transmission lines in the Hydro One corridor/easement. The concept was positively received by the City of Toronto Design Review Panel in October 2009, and was further developed in the 25% Preliminary Design Report for the Kipling Mobility Hub, dated May 28, 2010. However, due to changes in Hydro One restrictions on development in their corridor, that concept no longer satisfies Hydro One requirements.

A new design and location was needed that meet the requirements concerning safety, maintenance, and accessibility.

Metrolinx and Hydro One with MiWay, the TTC, and the City of Toronto, worked together to develop a new design identified in this report.



2009-2010 Kipling Bus Terminal Design Concept - looking southeast at the proposed bus terminal below Hydro One transmission lines.

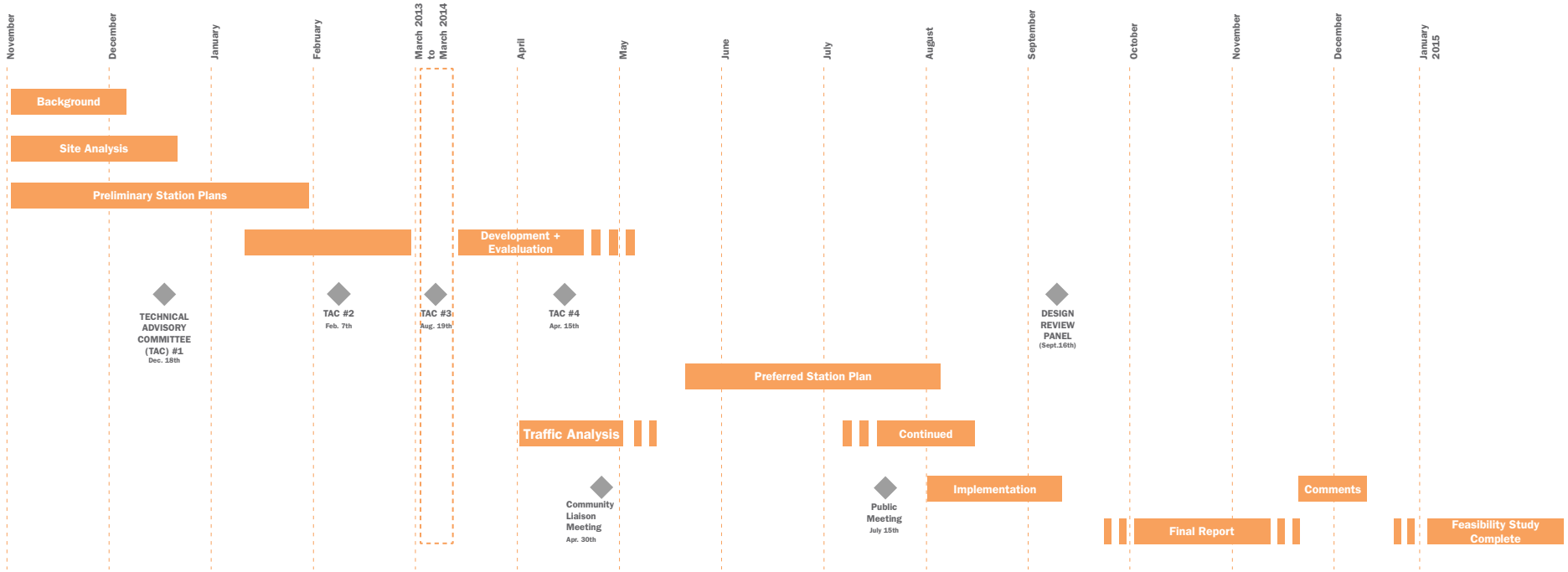
1.3 FEASIBILITY STUDY PROCESS

The Feasibility Study was developed over the course of an 24 month process. The process began with a review of the relevant background information and data, including the previous bus terminal studies outlined in section 1.2. Clear objectives, priorities and a detailed building program (as outlined in section 1.5) were developed early, together with an analysis of opportunities and constraints. A long list of Preliminary Station Plans was developed and presented at the Technical Advisory Committee (TAC) Meeting #1. These options were refined, and a short list of two Station Plans were developed and presented with a preliminary evaluation at TAC Meetings #2 and #3.

Community and public input on the two station plans was obtained through a Community Liaison Group meeting in April 2014; a meeting with the Board of 101 Subway Crescent in May 2014, and a public meeting in July 2014. A follow-up meeting with residents of 101 Subway Crescent in September 2014.

The TAC convened at four critical milestones in the development of the Study and provided feedback as outlined in Section 1.4.

The project was presented for feedback to the City of Toronto Design Review Panel in September 2014.



Study Schedule

1.4 STAKEHOLDER CONSULTATION

Technical Advisory Committee:

A TAC was convened for the purposes of the Kipling Bus Terminal Feasibility Study. The role of the TAC included:

- Providing technical feedback to the study team;
- Providing stakeholder perspective and input, particularly with respect to existing and proposed operations; and
- Reviewing and providing comments on draft versions of the Study.

The TAC included representatives from Metrolinx/GO Transit, the City of Toronto, the TTC, MiWay, Hydro One (HONI) and Infrastructure Ontario. Four TAC meetings were held during the study, including:

TAC Meeting #1, December 18th 2012

- Introduce the Study Team;
- Review the proposed schedule, scope of the study and the role of the TAC;
- Discussion around the design objectives and priorities;
- Review of the site opportunities and constraints;
- Review of the program elements; and
- Review of draft preliminary station plan options.

TAC Meeting #2, February 7th 2013

- Review of schedule;
- Review of feedback received to date;
- Review of new constraints;
- Review of preliminary traffic analysis;
- Summary of options development;
- Review of updated station plan options;
- Review of preliminary building plans for bus terminal, updated Passenger Pick-up and Drop-off (PPUDO) facility, GO platform buildings, and pedestrian tunnel;
- Review of bus terminal roof options;
- Review of utilities and service connections; and
- Review of preliminary landscape plans.

TAC Meeting #3, August 19th 2013

- Review of schedule;
- Review of draft Public Meeting panels;
- Update on analysis of options; and
- Received feedback on the preferred station plan.

TAC Meeting #4, April 15th 2014

- Review of schedule;
- Review of changes made to draft Public Meeting panels since TAC #3;
- Review of agenda for Community Liaison Meeting;
- Review of agenda for Public Meeting;
- Receive updated feedback regarding HONI landscaping policies; and
- Receive feedback regarding proposed crosswalk at Aukland Road.

Community Liaison Group Meeting:

A Community Liaison Group (CLG) was also convened for the Kipling Bus Terminal Feasibility Study. The group included local Councillors and representatives from the local residents' association, condo corporations and the local BIA. Staff from Metrolinx/GO Transit, the City of Toronto, the TTC, MiWay, also attended the Community Liaison Group meeting.

Community Liaison Group Meeting #1, April 30th, 2014

- Introduced the Study Team;
- Reviewed the proposed schedule, scope of the study and the role of the CLG;
- Reviewed and provided feedback on the proposed format for the Public Meeting; and
- Reviewed and provided feedback on the content of the Public Meeting Panels.

101 Subway Crescent Condo Board Meeting:

An additional meeting was held with the Board of the condo corporation at 101 Subway Crescent. The materials presented at the CLG Meeting were presented and reviewed.

Public Meeting:

A Public Meeting to review the work proposed as part of the Kipling Bus Terminal Feasibility Study was held on July 15th, 2014. The meeting was open to the general public and held at St. Andrew's Presbyterian Church, 3819 Bloor Street West, Toronto. The material was presented on a series of display boards and complemented by a moderated panel discussion where members of the public were invited to ask questions.

Design Review Panel Presentation

The Kipling Bus Terminal Feasibility Study was also presented to the City of Toronto Design Review Panel on September 16th, 2014. Feedback from the Design Review Panel was incorporated into the final version of the plans.

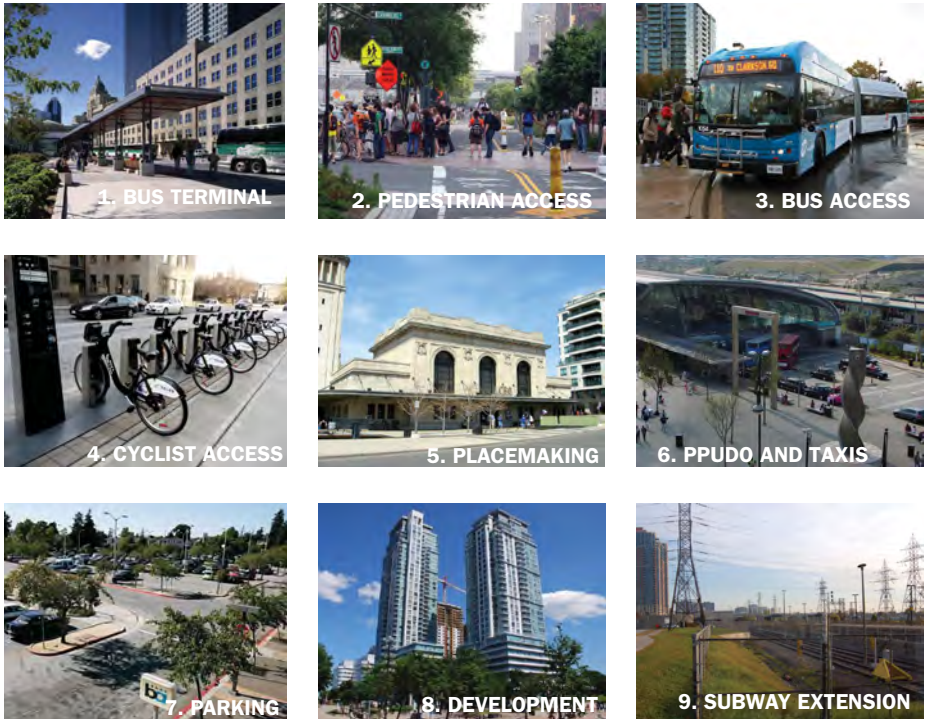
1.5 PRINCIPLES AND OBJECTIVES

The Study was guided by a clear Design Objective which was established at TAC Meeting #1:

- Deliver a new, integrated bus terminal.
- Upgrade GO station.
- Upgrade public realm.

TAC Meeting #1 also introduced the following prioritized principles that also served to guide the work and informed the evaluation criteria used to select the preferred option:

1. Bus Terminal
2. Pedestrian Access
3. Bus Access
4. Cyclist Access
5. Placemaking
6. PPUDO + Taxis
7. Commuter Parking
8. Development Potential
9. Subway Extension



Prioritized principles used for development and evaluation of the site options.

2.0 KIPLING STATION TODAY

2.1 EXISTING CONDITIONS

Kipling Station is located south of Dundas Street West and west of Kipling Avenue - near an intersection known as Six Points. A Canadian Pacific (CP) rail corridor bisects the site and is used by GO Transit as part of the Milton line. The TTC's Bloor-Danforth subway line (Line 2) runs at grade, parallel to and immediately north of the rail corridor. A major Hydro One distribution corridor runs north-south across the site, while an east-west distribution corridor runs parallel to the rail corridor.

Context

The surrounding context includes:

- South - the area south of the rail corridor is characterized by a mix of low-rise, post-war, employment uses. The A. W. Manby Transformer Station, at 850 Kipling Avenue, is immediately south of the study area.

- West - The segment of Dundas Street West, west of the study area is characterized by low- to mid-rise, post-war commercial uses, however many of the sites are in the process of being redeveloped into high-rise, mixed-use and/or residential developments. 101 Subway Crescent (a 1980's high-rise condo tower) is immediately west of the study area and 5353 Dundas Street West (a 1980's mid-rise commercial office building) is immediately north of the western portion of the study area.

- North - The area north of Dundas Street West generally consists of detached single-family homes from the 1950's.



Study Area Context

- East - The block immediately east of the study area consist of five new high-rise residential condo towers centred around Viking Lane, as well as a Toronto Water Works pumping station at the corner of Aukland and St. Albans Roads. The Six Points Plaza lies to the north (across Dundas Street West). The Six Points Interchange lies further east and the area is scheduled to be redeveloped into a high density, urban mixed-use centre over the coming decades (refer to section 2.2).

Land Ownership

Land ownership in the study area is fragmented and includes the following major landowners:

- Infrastructure Ontario - owns the largest parcel of land, corresponding roughly to the area underneath the Hydro One distribution wires.
- City of Toronto - owns the Subway Crescent right-of-way and the remaining portion of the study area to the west.

In addition to transit operations, the majority of the study area is currently used for commuter parking by the TTC. The City of Toronto maintains control of the public rights-of-way, while Hydro One maintains a series of easements in favour of its infrastructure.

The Study Area

The study area includes the following facilities:

- TTC subway station and stacked bus terminal with main entrance at the west and second entrance at the east (under the Kipling Avenue bridge);
- TTC subway tail tracks extending west of the station and immediately north of the GO Train platform;
- PPUDO building serving passenger pick-up and drop-off;
- North stair (on north side of Subway Crescent) serving the adjacent taxi stand;
- South stair (south of the rail corridor) serving the south parking lot;
- Pedestrian tunnel connecting the north stair, PPUDO facility, TTC Station Concourse, GO platform and south stair;
- TTC transformer station;
- GO Train platform with shelters and lighting;
- East GO platform building (connected by stair to the pedestrian tunnel) with ticket booth, waiting area, staff washroom and service rooms.
- Three hydro transmission towers along the south side of Dundas Street West and another three immediately north of the TTC subway tail tracks.
- Surface parking lots broken down into the north, west and south lots.

The site is characterized by significant grade changes that slope consistently from north to south at a rate of 4-7%, dropping between 4-5m from the elevation at Dundas Street West, to the elevation at the rail corridor. The natural grading has been modified significantly in the study area and has been terraced to accommodate the surface parking use. Reinforced slopes and/or retaining walls have been constructed: along the south side of Dundas Street West, along parts of Subway Crescent and along the north side of the rail corridor/TTC subway tail tracks to create these terraces.

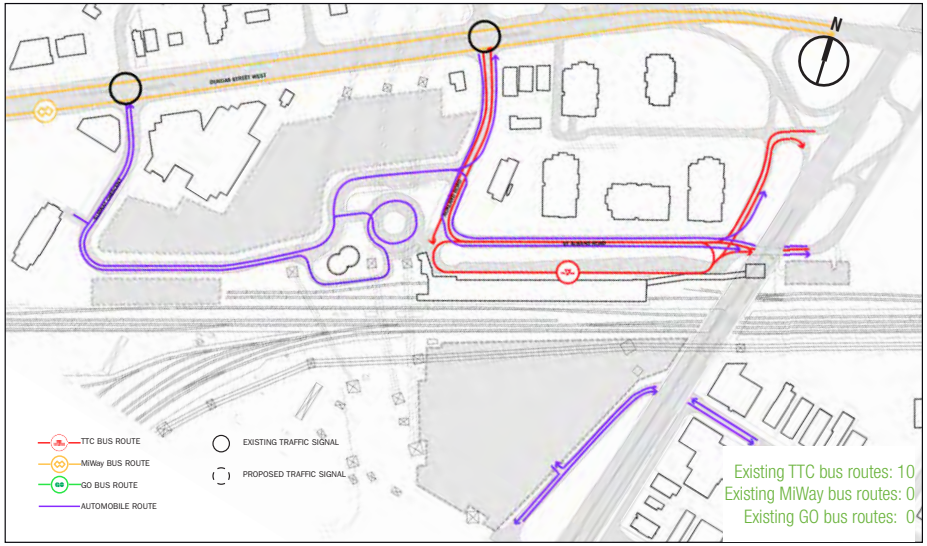
Heritage

There are no designated heritage buildings on the site, no known archaeological sites and no areas of natural heritage. That said, the Study recognizes the heritage value of the existing Kipling Subway Station, in particular, the barrel-vaulted concrete roof structure and the PPUDO concrete canopy.

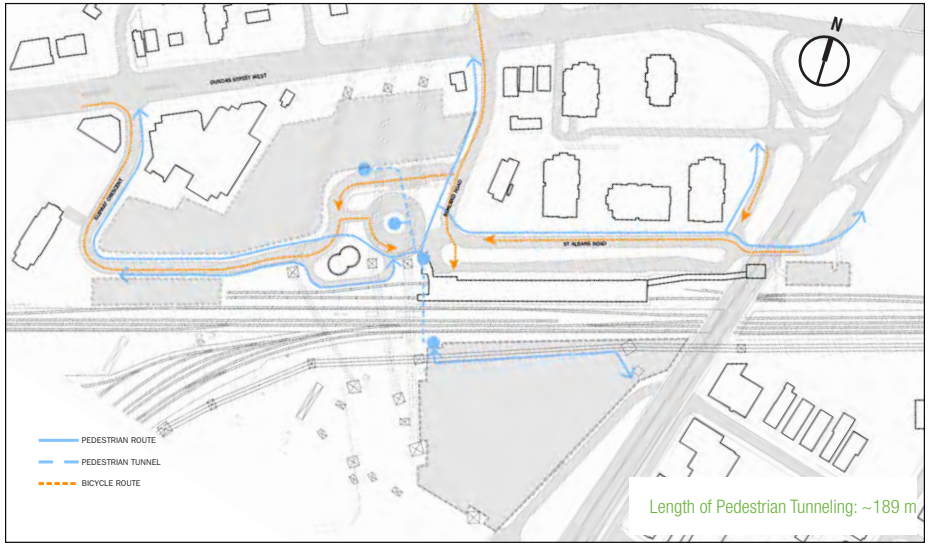
Site Access and Circulation

Existing site access and circulation is generally organized around the major modes as follows:

- TTC Buses - typically arrive from the west (along Dundas Street West) and access the existing TTC bus terminal via Aukland Road. A smaller number of buses make use of the ramps leading to Kipling Avenue off of St. Albans Road. Subway Crescent has been identified as an alternative route to be used in case of emergency closures of the main access routes.
- Automobile access through the Study Area is provided by Subway Crescent and Aukland Road. Access to the North and West parking lots is from Subway Crescent.
- Pedestrian infrastructure in the Study Area is limited. Sidewalks currently only exist only on the west side of Aukland Road, while the sidewalk along the south side of Subway Crescent follows the PPUDO access drive along the south side of the TTC transformer station. Sidewalk widths along this segment are sub-standard. Pedestrians are also served by the existing tunnel that connects the north parking lot, PPUDO facility, TTC subway station, GO Train platform and south parking lot.
- Cyclists are not served by any dedicated infrastructure at this time and access the station using the public roads in mixed traffic. Informal bike parking occurs at the main entrance to the TTC station (using nearby fences, posts and hydro towers). The City of Toronto has plans for grade-separated bike lanes along Dundas Street West (up to Aukland).
- Passenger Pick-up and Drop-off is served by Subway Crescent. Long queuing has been



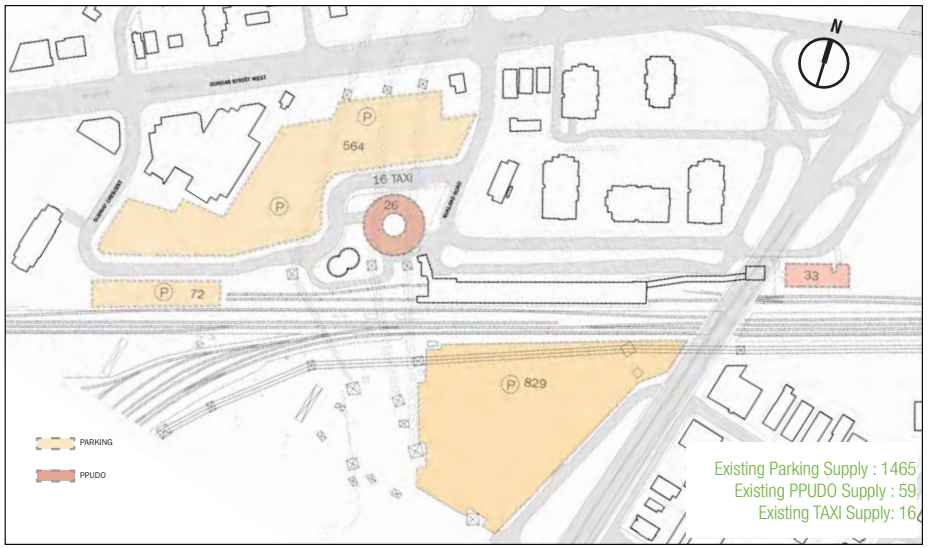
Existing Bus and Automobile Routes



Existing Pedestrian and Bicycle Routes

observed extending back to the area of 101 Subway Crescent at peak periods. At the request of the TTC, the former City of Etobicoke installed a chain link fence at the bottom of Aukland Road to discourage informal drop-off activities in this area which were causing significant delays to TTC busses accessing the bus terminal entrance. The second PPUDO facility at the east end of the station is accessed via St. Albans Road.

- The existing facilities provide 1,465 commuter parking spaces, and 59 PPUDO spaces (split between the east and west PPUDO facilities) as well as 16 taxi spaces accommodated along Subway Crescent (6 on the south side and 10 on the north side).



Existing Parking and Passenger Pick-up and Drop-off (PPUDO)

2.2 PLANNING CONTEXT

PROVINCIAL PLANNING FRAMEWORK

The 2008 Big Move regional transportation plan designates Kipling as an Anchor Mobility Hub - a focus of intensification at a major transit station in an area of strategic importance. The Kipling Mobility Hub is located in the Etobicoke Urban Growth Centre, which is planned to achieve a minimum density of 400 jobs and residents per hectare, as identified in the Growth Plan for the Greater Golden Horseshoe, 2006.

Kipling station is the western terminus of the Bloor-Danforth subway line and a station on the GO Milton train line. The Big Move anticipates significant increases in transit service levels at the Kipling Station over the next 25 years, with several future regional rapid transit services converging:

- Dundas Street bus rapid transit connecting Peel and Halton Regions to the Toronto Subway system.
- Rapid transit along Highway 427 to Pearson Airport.
- Two-way all-day service on the Milton GO line.

With the existing service and anticipated improvements, Kipling is the logical location for the new terminus for MiWay bus service.



Kipling Mobility Hub, identified in The Big Move, 2008



Etobicoke Centre Urban Growth Centre, identified in the Growth Plan for the Greater Golden Horseshoe, 2006

Mobility Hub Guidelines

Metrolinx's Mobility Hub Guidelines identify nine key objectives, grouped into the following key principles:

Seamless Mobility

- Seamless integration of modes at the rapid transit station;
- Safe and efficient movement of people with high levels of pedestrian priority;
- A well designed transit station for a high quality user experience; and
- Strategic parking management.

Placemaking

- A vibrant, mixed-use environment with higher land-use intensity;
- An attractive public realm; and
- A minimized ecological footprint.

Successful Implementation

- Effective partnerships and incentives for increased public and private investment; and
- Flexible planning to accommodate growth and change.

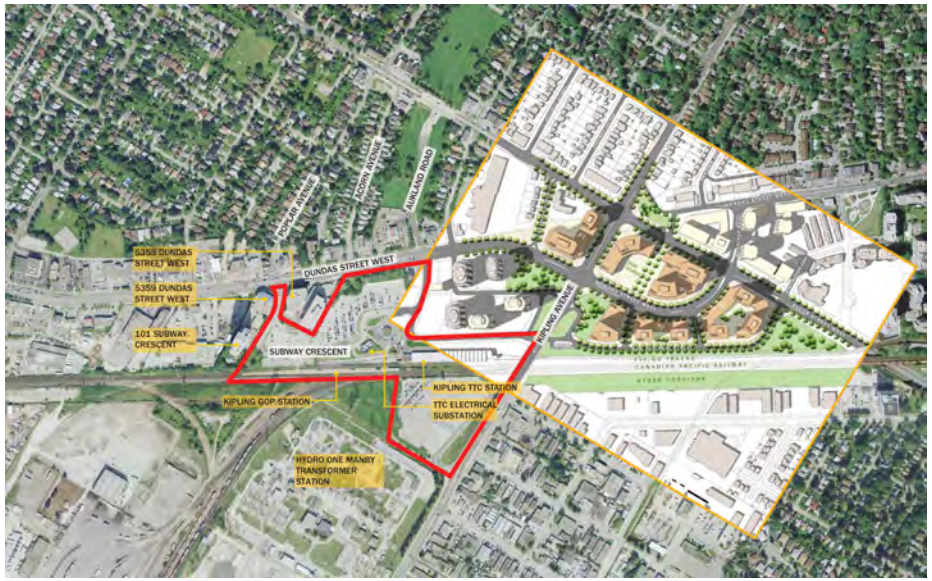
CITY OF TORONTO PLANNING FRAMEWORK

As part of the Etobicoke Centre Secondary Plan, the Study Area and its surroundings have been the subject of a number of City of Toronto planning initiatives that aim to develop a more urban, pedestrian-friendly and transit supportive environment.

These initiatives include an Environmental Assessment and design exercise to reconfigure the Six Points intersection, a Zoning By-law to shape and scale mixed use intensification, as well as guidelines for the implementation of a dynamic public realm.

Six Points Interchange Environmental Assessment, 2007

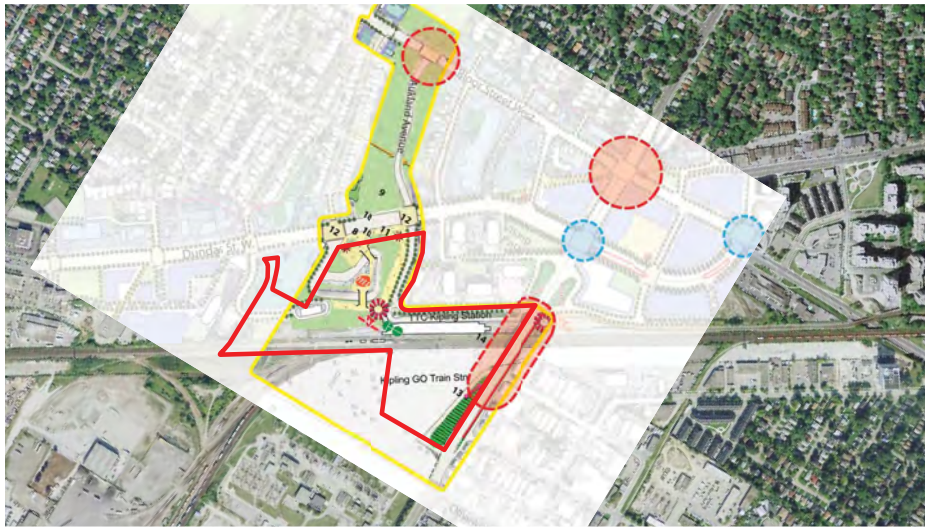
- The interchange at Dundas, Bloor, and Kipling will be normalized with a new intersection, as per the Six Points Interchange Environmental Assessment, and is now in detailed design. The western half of the site is reserved for green spaces and all buildings must reference the City of Toronto's built-form guidelines.
- A 22m height limit along Dundas Street West along with a 72m height limit for towers will maintain an adequate pedestrian scale.
- A 10m combined setback from Dundas Street West curb will allow for a more welcoming pedestrian environment.
- Maintaining a maximum tower floor-plate of 750m^2 will create light filled interior spaces and will also allow for visual connection with the streetscape.



Map: West Toronto Design Initiative

Etobicoke Centre Public Space and Streetscape Plan, 2011 (Map: Kipling Mobility Character Area)

- Maintain and extend the Hydro One corridor as a greenway with dedicated bicycle path to Dundas Street West.
- Widen sidewalk and special paving areas to identify the Mobility hub.
- Embellish way-finding and lighting to identify the Mobility Hub.
- Improve pedestrian crossings.
- Improve pedestrian connections with Kipling Avenue overpass.
- Mark entry into the Centre on Kipling overpass through special lighting or public art.



Map: Kipling Mobility Character Area

2.3 OPPORTUNITIES AND CONSTRAINTS

The Study Area presents a number of opportunities, as well as significant constraints, which requires setting clear priorities for the station area.

Opportunities within the Study Area include:

- Potential connections to the existing subway station, TTC bus terminal and GO station;
- Existing road network;
- Re-use and/or re-purposing of the existing PPUDO facility;
- Improving access, circulation and capacity of the existing PPUDO facility;
- Improving the public realm quality;
- Reducing the amount of hard surfaces and introducing storm-water storage or diversion strategies;
- Potential connections to existing pedestrian tunnels;
- Existing surface parking lots;
- Potential for new intersections;
- Shared (emergency) access for TTC buses across new road/driveway network;
- Additional property acquired by Metrolinx on the east side of Kipling Avenue and south of the rail corridor (just outside the Study Area); and
- Using the existing grades to improve access and circulation.

Constraints within the Study Area include:

- Restrictions on structures, land-uses and landscaping on Hydro One controlled properties within the Study Area (these include operational requirements and set-backs, as well as restrictions and easements registered on title);
- Public access that must be maintained to portions of Subway Crescent (specifically, 101 Subway Crescent);
- Existing traffic on the surrounding road network;
- Irregular property dimensions;
- Fragmented land ownership; and
- Existing grades that approach the limits of permitted slopes for bus operations in some areas.



Constraints

3.0 PROJECT SCOPE

3.1 GENERAL FUNCTIONAL AND OPERATIONAL REQUIREMENTS

General Requirements

The design and functionality requirements outlined below were established to help guide the Kipling Station design process. These requirements were ranked by the consulting team as a means to prioritize the requirements for the station area plan consistent with the Principles and Objectives outlined in Section 1.5. They include:

1. A New Bus Terminal: Designed to accommodate Mississauga Transit routes which currently terminate at Islington Station (12 bus bays) and potential future GO Bus routes (two bus bays).
2. Pedestrian Access: Provide convenient pedestrian connections between the new bus terminal, the existing TTC station concourse, the existing GO Station and Dundas Street West.
3. Bus Access: Provide a bus connection from Dundas Street West to the proposed new bus terminal, which reasonable accommodates foreseeable bus traffic. Maintain, or improve operations at the existing TTC bus terminal.
4. Cycling Access: Integrate cycling infrastructure to promote cycling to and from the terminal.
5. Placemaking: Construct a new bus terminal within a well-designed public realm, while improving accessibility for all users.
6. Passenger Pick-up / Drop-off & Taxi's: Construct a new PPUDO and taxi stand facilities to accommodate pick-up and drop-off activities.
7. Commuter Parking: Construct new commuter parking facilities to accommodate longer term parking requirements with provisions for paid parking.
8. Development: Protect for future and support existing transit-oriented-development.
9. Subway Extension: Protect space for the future west extension of the Bloor-Danforth subway line identified in the City of Toronto Official Plan.

Bus Terminal Circulation Area & Bus Bay Design Criteria

Through meetings with GO Transit and MiWay stakeholders, it was agreed upon that GO could likely operate their potential future bus service with two designated platforms within the new terminal. On this basis, the design team went forward with two platforms for GO and 12 platforms for MiWay, with potential future changes possible. More detail on GO scheduling was not provided, so the 2:12 platform allocation, for GO and MiWay respectively, has been included for this design.

The functional elements of the proposed bus terminal circulation were designed with the majority user, MiWay, in mind. It was agreed upon that the design for these elements would be drawn from existing TTC specifications for stations, given MiWay's absence of a detailed design standard on which to rely. GO buses have been tested using AutoTrack simulation software to confirm major movements and suitability of using this alternative design standard.

In compliance with TTC design standards, the clear width of the bus circulation area is 8.3 metres. Bus platform lengths vary, with 10 MiWay platforms having an overall length of 18.3 metres, two MiWay platforms for articulated buses having a length of 25 metres, and two platforms for accommodating GO buses having a length of 19.2 metres. The option exists for GO to use two of the standard length MiWay platforms without compromising station operations. All platforms are of a sawtooth-style with an indent width of 2 metres from the travel way.

Station Building Program Requirements

The following detailed building programs for the Bus Terminal and GO Station buildings were prepared, based on GO Transit Design Requirements Manual and augmented based on stakeholder consultation.

KIPLING STATION
GO BUILDING/ PLATFORM

- GO Design Requirements Manual 2012
- GO Transit Project Charter 2011-08-11
- TTC Design Manual 2009
- Ontario Building Code 2010 (Group A Division 2)
- Accessibility for Ontarians with Disabilities Act 2009

Item	Space Name	Area (sm)	Dimensions	Adjacency
	Public			
P01	Mini Platform	TBD		Serving both sides of the Island Platform with DWA coverage
P02	Accessible Ramp			Located in north underground corridor owned by TTC
P03	Passenger Elevator (x2)	11	Each 5.5sm	
P04	Passenger Elevator Lobby (x2)	15	Each 7.5sm	
P05	Accessible Public Washroom	5		Area as per GO Design Requirements Manual 2012
P06	Waiting Area	40		20sm of waiting area & 20sm of queuing area
P07	Ticket Sales Office	16	2.1m x 1.6m	View to platform level
P08	Concession/ Retail	16		Adjacent to waiting area and includes 4sm of retail storage
P09	Fare Collection Equipment	TBD		PRESTO, TVM – GO to determine if req'd
P10	New Pedestrian Tunnel	8		Concourse Level
	Service Areas - General			
S01	Station Attendant's Back Office	12		
S02	Staff Washroom	5		Attached to station attendants back office
S03	Maintenance Room	15	3.0m x 5.0m	Platform level
S04	Janitor's Closet	4		Dimensioned according to TTC Design Manual 2009
S05	Janitor's Change Room	4		Dimensioned according to TTC Design Manual 2009
	Service Areas - Mechanical			
S06	Mechanical Room	8		Platform level
S07	Snow Melting Boiler Room	TBD		
	Service Areas- Electrical			
S08	Electrical Room	TBD	Minimum 17m wall space	Platform level
S09	Communications Room	15.4	3.2m x 4.8m	Adjacent to electrical room
	Service Areas - Signals			
S10	Electrical Signal Shed			CP signal shed to be relocated further east
	Ancillary Rooms			
A01	Elevator Machine Room (x2)	29.6	Each 3m x 4.8m (14.8sm)	
Total Area (sm)		**204**		

KIPLING STATION
MiWay & GO BUS TERMINAL

GO Design Requirements Manual 2012
GO Transit Project Charter 2011-08-11
TTC Design Manual 2009
Ontario Building Code 2010
Accessibility for Ontarians with Disabilities Act 2009

Item	Space Name		Area (sm)	Dimensions	Adjacency
	Public				
P01	Roof Canopy & Platform	TBD			Refer to p191
P02	Male Washroom		16		Refer to station req'mts
P03	Female Washroom		16		Refer to station req'mts
P04	Accessible Public Washroom		5		Refer to station req'mts
P05	Waiting Room	TBD			Larger than station waiting room requirements. GO Transit to advise
P06	Bus Dispatcher Room				Located on an external wall or within the waiting room
P07	Ticket Sales Office		16	2.1m x 1.6m	
P08	Concession/ Retail		16		Adjacent to waiting area and includes 4sm of retail storage
P09	Fare Collection Equipment	TBD			PRESTO, TVM – GO to determine if req'd
	Service Areas - General				
S01	Driver Room	TBD			Adjacent to bus dispatcher room
S02	Station Attendant's Back Office		12		Adjacent to staff room
S03	Staff Room	TBD			Shared by dispatcher, drivers, and station attendants
S04	Staff Washroom		5		Adjacent to staff room. Separate male & female washrooms may be req'd
S05	Maintenance Room		15	3.0m x 5.0m	Platform level
S07	Janitor's Closet		4		Dimensioned according to TTC Design Manual 2009
S08	Janitor's Change Room		4		Dimensioned according to TTC Design Manual 2009
	Service Areas - Mechanical				
S09	Mechanical Room		8		Platform level
S10	Snow Melting Boiler Room	TBD			
	Service Areas- Electrical				
S11	Electrical Room	TBD		Minimum 17m wall space	Platform level
S12	Communications Room		15.4	3.2m x 4.8m	Adjacent to electrical room
Total Area (sm)			**132.4**		

4.0 STATION AREA PLAN OPTIONS

After reviewing the long-list of site area plan options presented at TAC Meeting #1, the consultant team worked with Metrolinx staff to test and evaluate the options. A pair of station area plan options were then selected from the long list for further study. These options were presented at TAC Meeting #2, together with a preliminary evaluation. The following sections describe the options, their analysis, evaluation and the recommendation of a preferred station area plan option. Elements common to both station area plan options are described below, while elements unique to each option are described in sections 4.1 and 4.2.

Bus Terminal Building

Both options included the same bus terminal building and associated pedestrian tunnels. The bus terminal is described in detail in section 5.1, but includes the following major elements:

- 14 bus bays;
- Passenger Building containing: designated waiting area, ticket booth, retail space, public washrooms and connection to pedestrian tunnels;
- Service Building containing: staff washrooms and lunch rooms for both GO and MiWay staff, mechanical and electrical rooms, the snow-melt boiler room, and a dispatch office;
- Single large roof canopy connecting the Passenger and Service Buildings, and providing cover over the extent of the bus platform;
- West Tunnel Entrance building to the north of the main Bus Terminal Building; and
- New accessible GO building located at the west end of the GO platform.

Future west-ward extension of the Bloor-Danforth subway line will require replacement of the bus terminal, but it is anticipated the bus terminal would be relocated to the new subway terminus station.

Site Access

Both options also share the following elements related to site access:

- Access to the new bus terminal is provided by a modified Subway Crescent;
- Subway Crescent is terminated at a cul-de-sac adjacent to the entrance driveway for 101 Subway Crescent.
- An east-west pedestrian 'spine' provides dedicated pedestrian access from Subway Crescent to the new Bus Terminal, commuter parking lots, existing PPUDO building and existing TTC Subway Station entrance (at Aukland and St. Albans Roads).
- A flat landscaped area at the base of the Hydro One towers immediately north of the TTC subway tail tracks (landscaped to provide access for service vehicles).

Pedestrian Access

The two options share the following elements of pedestrian amenity:

- Sidewalks and landscaping along the modified Subway Crescent;
- Sidewalk and landscaping along Aukland Road;
- Accessible pedestrian tunnel connecting the new bus terminal with the existing PPUDO facility and the GO Train platform;
- Transit Plaza around the existing PPUDO facility; and
- The primary east-west landscaped pedestrian spine connecting Subway Crescent to the main TTC Station Entrance.

Cycling Access

The two options share the following elements of cycling infrastructure:

- Access to the main east-west spine connecting Subway Crescent to the main Station Entrance;
- Indoor bike parking inside the West Tunnel Entrance at the bottom of the modified Subway Crescent; and
- Outdoor bike parking under the canopy of the existing PPUDO facility, at the main Station Entrance and outside the West Tunnel Entrance.



ELEMENTS COMMON TO BOTH OPTION 1 AND 2 STATION AREA PLANS

Placemaking Opportunities

The two options share the following opportunities for placemaking:

- East-west pedestrian 'spine' connecting the modified Subway Crescent to the main Station Entrance;
- Transit Plaza at the base of the existing PPUDO facility and convergence point of all pedestrian activity at the station;
- Generous landscaping along the south edge of the property offering significant opportunities for on-site storm-water management;
- Improved landscaping along the west retaining wall and Dundas Street West frontage;
- Informal seating areas;
- Improved site lighting;
- Preservation of the iconic PPUDO canopy;

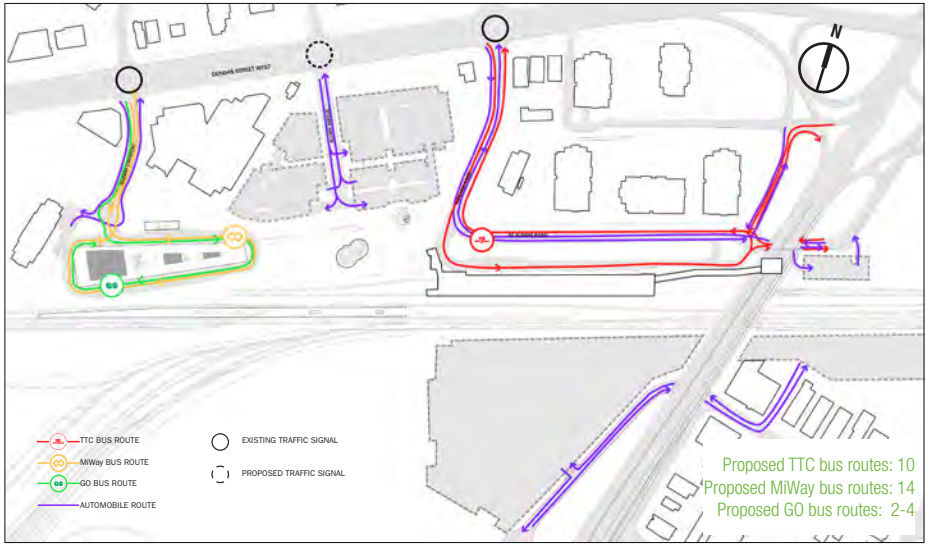
Specific elements of Station Area Plan Options 1 and 2 are described in sections 4.1 and 4.2.

4.1 OPTION 1

Site Access

Station Area Plan Option 1 is characterized by the Acorn Avenue extension that provides dedicated access to the site. Vehicular access to the commuter parking lots and PPUDO does not interfere with either the TTC buses on Aukland or MiWay and GO buses on Subway Crescent. Emergency access to the Acorn Avenue intersection would be made available for TTC buses.

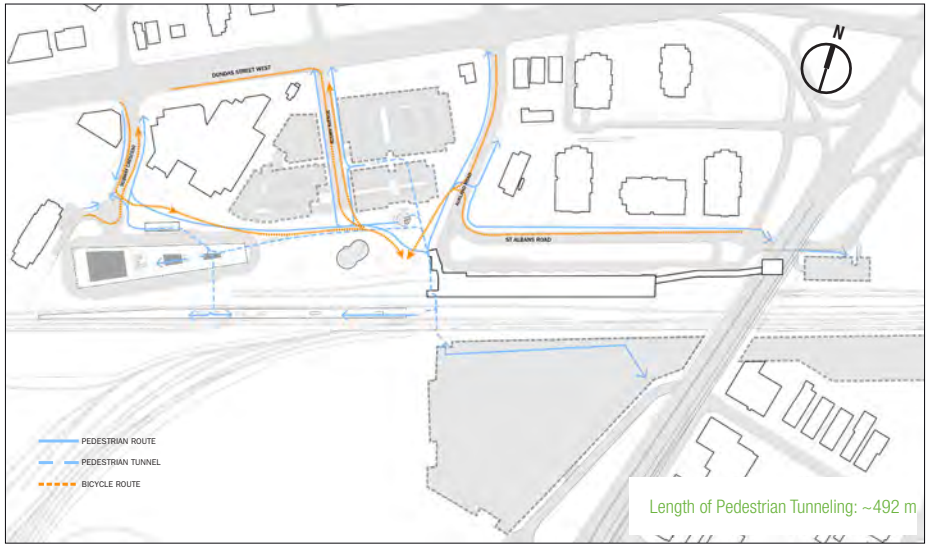
Direct pedestrian and cycling access to the PPUDO entrance is provided along either side of the Acorn Avenue extension. A secondary network of pedestrian walkways also serves the surface parking lots. East-west pedestrian circulation is provided by the generous walkway common to both options. Option 1 results in 1,265 commuter parking spots, 99 PPUDO spaces and six taxi spaces.



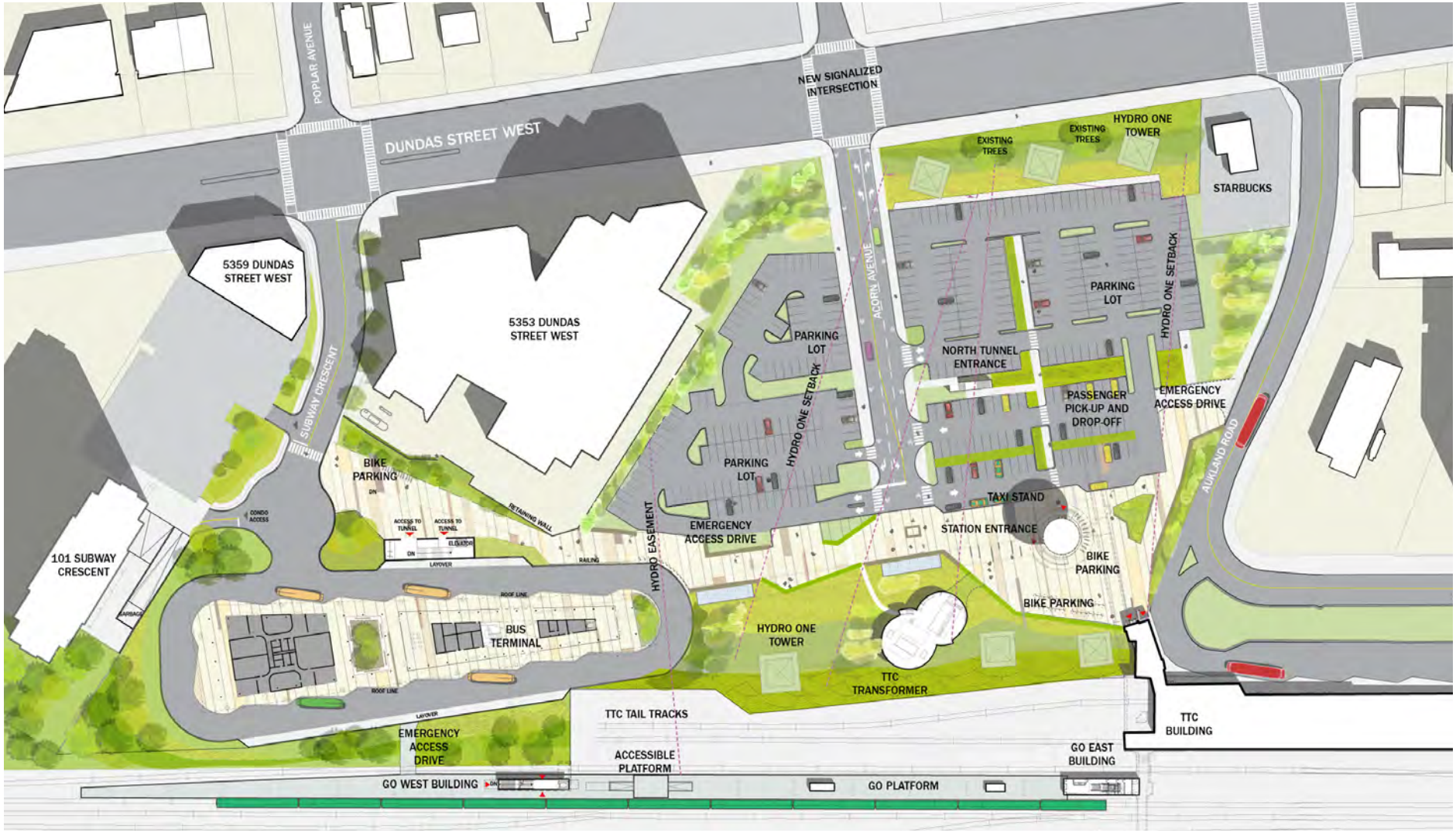
Option 1: Bus and Automobile Routes



Option 1: Parking, PPUDO and Taxi



Option 1: Pedestrian and Bicycle Routes



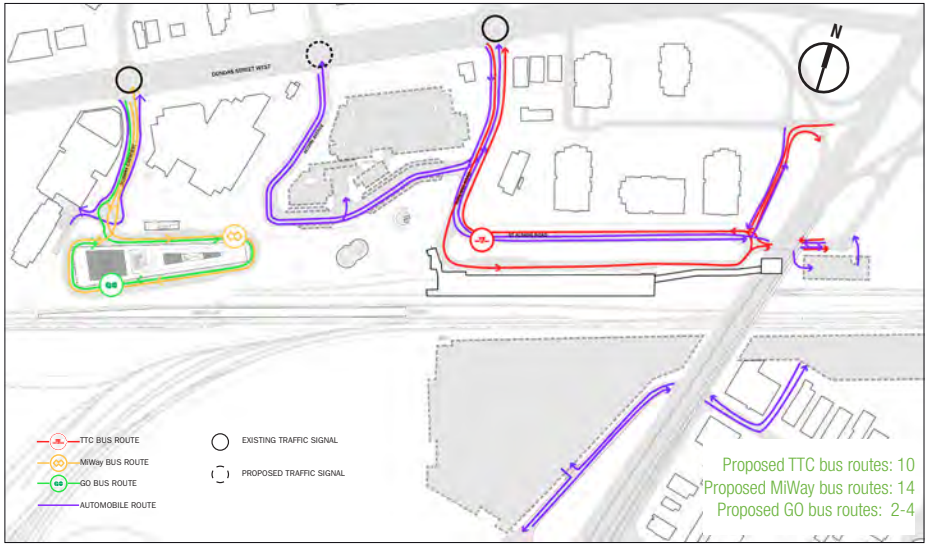
OPTION 1 STATION AREA PLAN

4.2 OPTION 2

Site Access

Station Area Plan Option 2 is characterized by the Acorn Avenue extension that continues east to Aukland Road at approximately the same location as the current Aukland-Subway intersection. Access to the PPUDO would be off of Acorn Avenue and accessible from either Acorn Avenue or Aukland Road. Emergency access along Acorn Avenue for TTC buses would be similar to the current operations along Subway Crescent.

Pedestrian and cycling access to the PPUDO entrance is provided along the east and south side of the Acorn Avenue extension. East-west pedestrian circulation is provided by the generous walkway common to both options. Option 2 results in 1,219 commuter parking spots, 59 PPUDO spaces and six taxi spaces.



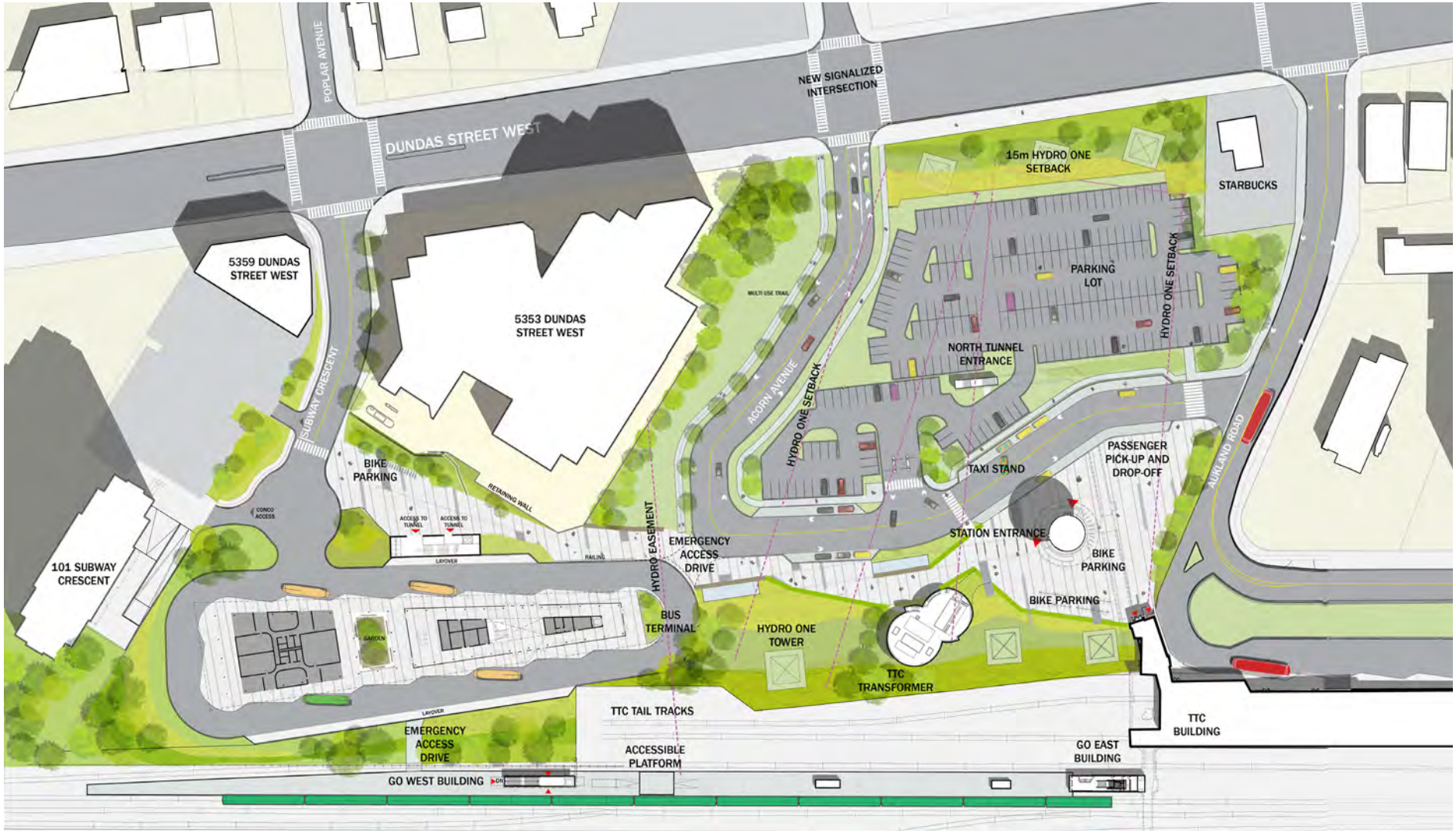
Option 2: Bus and Automobile Routes



Option 2: Parking, PPUDO and Taxi



Option 2: Pedestrian and Bicycle Routes



OPTION 2 STATION AREA PLAN

4.3 EVALUATION AND ANALYSIS

4.3.1 Public Realm Considerations

The two Station Area Plan Options were evaluated from the perspective of their relative impacts on the public realm. This includes an evaluation of:

- Pedestrian access
- Cycling access
- Placemaking opportunities

Pedestrian Access

The options differ in the following ways:

- Option 1 offers more direct pedestrian access from Dundas Street West at Acorn Ave intersection to the Station Entrance, compared to the indirect route in Option 2; and
- Option 1 includes a secondary tier of pedestrian walkways that connect the north parking lot to the existing PPUDO facility.

These differences indicate that Option 1 offers a better level of pedestrian amenity.

Cycling Access

The options differ in the following ways:

- Option 2 includes a bi-directional, multi-use trail along the west and south sides of Acorn Avenue, compared to the sharrows along Acorn Avenue included in Option 1.

These differences indicate that Option 2 offers a higher level of safety for commuters arriving by bicycle.

Placemaking Opportunities

The options differ in the following ways:

- Option 1 offers a clear, formal and intuitive entrance to the site along the Acorn Avenue extension, as opposed to the indirect route shown in Option 2; and
- Option 1 includes a significant number of landscaped areas within the north parking lot that add to the amenity of the areas while also serving to collect and redirect storm water.

These differences indicate that Option 1 offers a greater number of public realm opportunities.

4.3.2 Transportation Operations & Traffic Considerations

BA Group has completed a Transportation Operations Study that evaluates the two Kipling Station Area Plan options which were developed through the planning process by the consulting team. This technical transportation operations analysis and assessment was undertaken for both options considers the following:

- Traffic operations on the area street system;
- Queuing activity on key road segments in the Station Area;
- Operation considerations regarding the proposed signalization of the Acorn Avenue / Dundas Street West intersection;
- Bus travel times in the Station Area (TTC and MiWay);
- Traffic volume changes on the area road system resulting from the development of the Station Area Plan options;
- Parking provisions; and,
- Accommodation of passenger pick-up and drop-off (PPUDO) activity.

The Transportation Operations Study can be found in Appendix A. The following sections provide an overview of the assessment undertaken and outlines the key findings from the study.

Traffic Activity & Operations

A traffic operations analysis was undertaken for each of the three intersections located within the immediate vicinity of the Kipling Station Area along Dundas Street West, Aukland Road, Acorn Avenue and Subway Crescent to establish the implications of either option on general area traffic conditions. The intersection analysis was undertaken based on forecast future peak hour traffic volumes for both options considering a 10-year time horizon, and incorporates allowances for planned changes to the area road system (e.g. Six Points Interchange Reconfiguration) and area developments. The peak hour is defined as 8:00a.m. to 9:00a.m. in the morning and 4:45p.m. to 5:45p.m. in the evening. Existing conditions were assessed for reference purposes.

The forecast traffic operations for Options 1 and 2 are summarized below. Particulars on the forecast future traffic volumes, including the detailed capacity analysis sheets, can be found in the complete Transportation Operations Study provided in Appendix A.

Traffic operations analyses have been undertaken in accordance with the methodologies outlined in the Highway Capacity Manual (HCM) using the Synchro (Version 7) software package. The primary product of the signalized intersection capacity analysis evaluation is two sets of intersection performance indices.

The first is a volume-to-capacity (or v/c) ratio that provides an indication of the capacity utilization for movements at an intersection and at the intersection overall. A v/c ratio of 1.0 indicates that a turning movement or intersection may be operating at or near its theoretical capacity. The second measure is a level of service (LOS) indicator that provides a measure of the average level of delay that a motorist may experience while travelling through an intersection. The level of service indicator ranges from LOS A (little delay) to LOS F (extended delays).

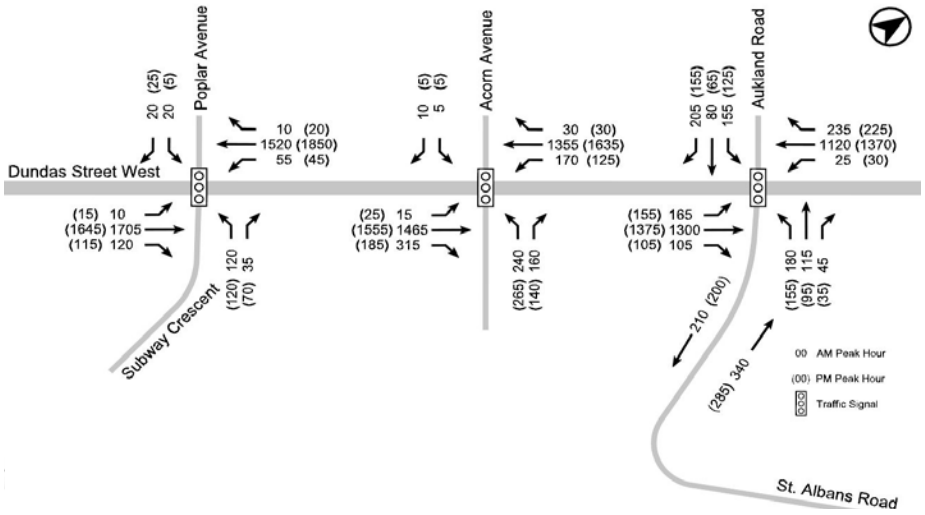
Levels of Service provided at the three intersections along Dundas Street West are outlined in the two figures below for Options 1 and 2, respectively. A summary discussion of traffic operations for both options is also provided.

Further analysis was undertaken using VISSIM micro simulation software package, provides a detailed review of "real time" traffic conditions in the area for the two options. The VISSIM output has been used to provide operational detail related to level of service at the study area intersections, as well as other information such as queue lengths and travel time.

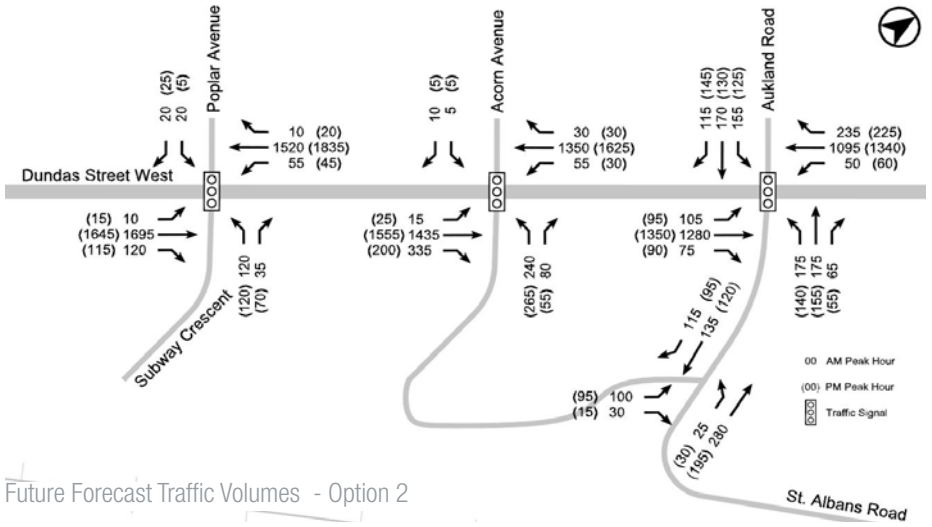
Future Traffic Volumes - Option 1 & 2 Comparison

Forecast future traffic volumes for Option 1 and 2 are shown in the following two figures and represent peak hour volumes for a 10-year horizon period. While through traffic volumes on Dundas Street West are similar between the two options, there are some notable differences with respect to the use of Acorn Avenue and Aukland Road. Option 1 provides access to the parking and PPUDO facility soley via the Acorn Avenue / Dundas Street West intersection. Accordingly, traffic to / from this facility is routed through the Acorn Avenue / Dundas Street West intersection.

In Option 2, Acorn Avenue extends to Aukland Road, providing an additional connection to the parking and PPUDO facility. Therefore, a portion of traffic related to this facility is routed through the Acorn Avenue / Aukland Road intersection.



Future Forecast Traffic Volumes - Option 1



Future Forecast Traffic Volumes - Option 2

Future Level of Service - Option 1 & 2 Comparison

Each of the area intersections operate acceptably for Option 1 with an overall intersection v/c ratio of 0.85 or less during the AM and PM peak hours. Overall, Level of Service (LOS) values are within the A to C range. These results are indicative of acceptable overall performance levels.

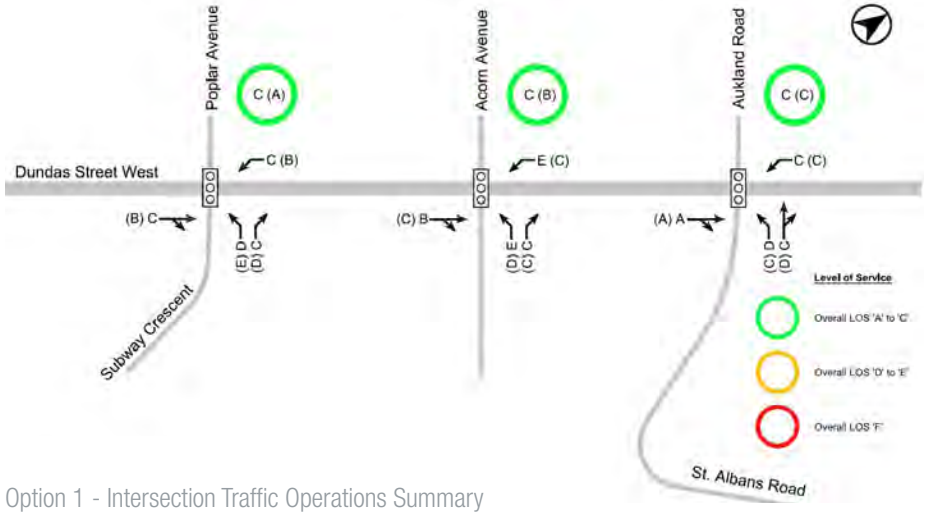
Individual turning movements at the area intersections operate within v/c ratios of 0.94 or less during the peak periods and at LOS E or better. Movements that can experience higher end delays include the northbound and westbound left turn movements at the Acorn Avenue / Dundas Street West intersection. These movements can operate with an LOS of E during peak hours. This is considered reasonable within a busy urban environment, particularly for left turn movements.

Each of the area intersections also operate acceptably under Option 2, exhibiting similar overall Levels of Service and v/c ratios, as provided under Option 1. Overall v/c ratios are 0.85 or better, while Levels of Service are LOS C or better. These results are indicative of acceptable overall performance levels.

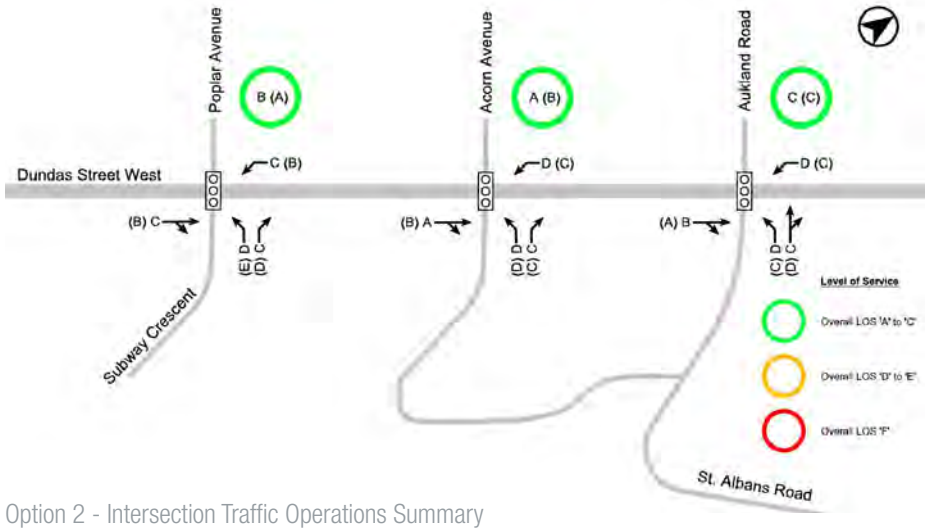
Individual turning movements are similar to Option 1 and operate within v/c ratios of 0.90 or less during the period periods and at a LOS of E or better. The northbound left turn at Subway Crescent / Dundas Street West can experience higher end delays during peak hours and operates within the LOS D to E range, similar to Option 1. The westbound at Aukland / Dundas Street West can also operate with more extended delays in the AM peak hours, when it operates at LOS E.

Overall, a review of Option 1 and 2 indicates that the network is forecast to operate satisfactorily under both options during peak hours from a capacity analysis perspective. Anticipated v/c ratios and Levels of Service values are within acceptable levels experienced in busy urban environments and are similar in either option at the three key intersections along Dundas Street West. Forecast vehicular and bus volumes can be reasonably be accommodated in either option, including future MiWay activity on Subway Crescent.

Option 2, however, provides modestly improved operations at the proposed Acorn Avenue / Dudas Street West intersection, while Option 1 provides better operations at the Aukland Road / Dundas Street West intersection.



Option 1 - Intersection Traffic Operations Summary



Option 2 - Intersection Traffic Operations Summary

Queuing Review

Traffic operations were further reviewed at the three key signalized intersections on Dundas Street West and the connecting streets to provide additional information relative to the performance of both Kipling Station Area options being considered from a queueing perspective. Key in this regard is developing and understanding the extent of queuing activity on Aukland Road, Subway Crescent, Acorn Avenue, as well as at the proposed new signalized intersection on Dundas Street West at Acorn Avenue. This understanding allows us to ascertain whether the anticipated future traffic activity levels from either of the options can be reasonably accommodated on the area road network.

This analysis was undertaking using the VISSIM microsimulation software. VISSIM is a microscopic, behaviour-based, multi-purpose traffic simulation program which is utilized for traffic analysis. The VISSIM model was used to report 50th percentile and 95th percentile queues forecast at the key intersections for both options under future conditions. The following is a summary of the queuing activity at the key intersections and within the Station Area for both Options 1 and 2.

Proposed Signalized of the Acorn Avenue / Dundas Street West Intersection

Both Kipling Station Area design alteratives require a traffic signal at the Acorn Avenue / Dundas Street West intersection as documented in Appendix A. The signal is necessary in order to provide access to the proposed PPUDO and parking facilities on-site. Acorn Avenue, is located approximately 150 to 160 metres to the adjacent signalized intersections at Subway Crescent / Poplar Avenue and Aukland Road.

Queuing activity was reviewed under Options 1 and 2 at the proposed Acorn Avenue / Dundas Street West signalized intersection to confirm if eastbound and westbound queuing would spill back to adjacent signalized intersections.

Simulation results, shown below, suggest that eastbound and westbound queues at this intersection will not significantly impact (or extend to) the adjacent signalized intersections, provided that signal timing plans between the three Dundas Street West signalized intersections are coordinated to provide a continuous east-west green band along Dundas Street West study area. This coordination would improve east-west traffic flow.

Additionally, further capacity analysis undertaken as part of this study indicates that the intersection would benefit from an advanced westbound left turn phase during the AM and PM Peak hours.

Acorn Avenue / Dundas Street West - Queuing Length Review

Approach	Points of Interference	Future - Option 1		Future - Option 2	
		50th Percentile Queue Length	95th Percentile Queue Length	50th Percentile Queue Length	95th Percentile Queue Length
Eastbound	150m	30m (20m)	90m (50m)	20m (15m)	35m (30m)
Westbound	125m	35m (30m)	55m (45m)	25m (25m)	40m (40m)
Northbound	57m	35m (35m)	50m (60m)	30m (30m)	45m (45m)

Notes:
1. AM (PM) Peak Hours.
2. Queue Lengths rounded to the nearest 5 metres.
3. Assumes coodinated signal timing with adjacent intersections.

Existing Signalized Intersection Queueing Activity

Similar to the Acorn Avenue / Dundas Street West intersection, a queueing review was also completed for the Subway Crescent / Dundas Street West and Aukland Road / Dundas Street West intersections. This review was completed in order to ensure that outbound traffic queues would not:

a) extend down Subway Crescent to the planned driveway of the proposed MiWay / GO bus terminal; and,

b) block TTC buses exiting the exisiting TTC bus terminal on Aukland Road / St. Albans Road.

As illustrated in the following table, queues on Subway Crescent would range from 20 metres to 40 metres for Option 1 and 20 metres to 40 metres for Option 2. This level of queueing is typical and will not extend south to the proposed bus terminal or 101 Subway Crescent condominium site driveway in either Option 1 or 2. Therefore, anticipated queues are considered to be reasonable and would not unduly impact the operation of Subway Crescent.

Subway Crescent / Dundas Street West - Queuing Length Review

Approach	Points of Interference	Future - Option 1		Future - Option 2	
		50th Percentile Queue Length	95th Percentile Queue Length	50th Percentile Queue Length	95th Percentile Queue Length
Northbound	120 metres to bus terminal access. 50 metres to centreline of Blue P parking lot access.	20m (20m)	40m (40m)	20m (20m)	40m (40m)

Notes:
1. AM (PM) Peak Hours.
2. Queue Length rounded to the nearest 5 metres.

As illustrated in the following table, queues on Aukland Road would range from 35 metres to 90 metres for Option 1 and 45 metres to 120 metres for Option 2. This level of queuing is typical and is not forecast to extend back to the TTC bus terminal driveway in either Option 1 or Option 2. It is noted, however, that queues on Aukland are more pronounced in Opinion 2 and it is anticipated that, on occasion, queues would extend back to the proposed east-west Acorn Avenue connection to Aukland Road during the AM peak hour.

Aukland Road / Dundas Street West - Queuing Length Review

Approach	Points of Interference	Future - Option 1		Future - Option 2	
		50th Percentile Queue Length	95th Percentile Queue Length	50th Percentile Queue Length	95th Percentile Queue Length
Northbound	140 metres to TTC Bus Exit 100 metres to Acorn Avenue east-west extension to Aukland (Option 2)	35m (30m)	90m (70m)	60m (45m)	120m (95m)

Notes:
1. AM (PM) Peak Hours.
2. Queue Lengths rounded to the nearest 5 metres.

Bus Travel Times

An analysis of travel time for key bus routes was undertaken through use of VISSIM simulation software. Several simulations were undertaken as a high level comparative analysis of the implications of both Station Area design alternatives on bus operations in the area, as well as the difference in delays that may arise from both options considered. This is to provide further information to inform the preferred Station Area option selection process. These delays are provided as a relative measure of the performance for each option and the general ability of buses to operate in this context. For the purposes of this comparison, travel times to / from the west, east and north from both the existing TTC bus terminal loop and the proposed Mi-Way / GO terminal were measured.

Simulations were performed during the AM and PM peak hour, and for both Options 1 and 2. The following summarizes the anticipated travel times results for the TTC and MiWay busses.

The recorded average travel times, through the simulation program VISSIM, can be found within the complete Transportation Operations Study in Appendix A. The TTC and MiWay travel times were determined through microsimulation for a set inbound and outbound route distance within the study area. Travel times include the time it takes for a bus to travel this set distance, and also the delays experienced at intersections. The following figures illustrates both the TTC and MiWay travel routes measured.

TTC Travel Times

During the AM and PM peak hour inbound travel times ranged from 68 to 91 seconds, while outbound travel times ranged from 54 to 123 seconds for Option 1. For Option 2, AM and PM inbound travel times ranged from 59 to 77 seconds, while outbound travel times ranged from 62 to 128 seconds. The analysis indicates that travel times for all routing patterns will be within 15 seconds of each other for both Options 1 and Option 2.

Of particular note, busses travelling to the north may experience modestly longer delays in Option 2 vs. Option 1. This is likely attributed to a greater vehicular demand on Aukland Road in Option 2, where the long term parking and PPUDO facility has a connection to Aukland Road. Therefore Option 2, based on the analysis presented, would have a larger impact on TTC bus travel time, particularly for routes travelling to the north on Aukland road.

MiWay Travel Time

During the AM and PM peak hour inbound travel times ranged from 43 to 152 seconds, while outbound travel time ranged from 58 to 97 seconds for Option 1. For Option 2, AM and PM inbound travel times ranged from 43 to 105 seconds, while outbound travel times ranged from 53 to 83 seconds.

The analysis indicates that travel time for MiWay buses under Option 1 will have longer travel times than in Option 2 for travel to/from the north and east. Travel time to/from the west was largely observed to be the same in the two options. This may be due to the higher demands for the eastbound left turn at the Dundas Street West / Aukland Road intersection in Option 1 vs. Option 2. Therefore Option 1 may have a larger impact on MiWay bus travel time for routes destined to the north on Aukland.

Summary

Forecast travel times experienced in both Options are considered to be reasonable within busy urban environments. As such, it is anticipated that both TTC and MiWay bus routes will operate acceptably without unreasonable delays from Kipling Station.



TTC Travel Time Routes



MiWay Travel Time Routes

Utilization of Area Roads

The two proposed Kipling Station Area options will alter the use and characteristics of the existing study area roads that connect to Dundas Street West. The options would modify the existing road network configuration and also provide additional connectivity to Dundas Street West via a new signalized intersection on Acorn Avenue.

The following is an assessment summary of road link volumes for both options in order to provide a comparison of the relative road volumes under existing and future traffic conditions under Options 1 and 2. The following road link volumes were summarized:

- Northwest Kipling Station Area - measured south of Dundas Street West and west of Aukland Road
- Subway Crescent (North-South Leg) - measured south of Dundas Street West
- Aukland Road - measured south of Dundas Street West
- Subway Crescent (East-West Leg) - measured west of Aukland Road

Northwest Kipling Station Area - Screen Line Review

A screenline assessment of Kipling Station indicates that future total traffic volumes entering the Station Area will change substantially compared to existing conditions. Overall, volumes will decrease due to the elimination of the current Subway Crescent long-term parking lot. Additionally, current through traffic volumes using Subway Crescent will be eliminated as Subway Crescent will be truncated in both Options 1 and 2.

As outlined in the following table, traffic volumes will decrease by approximately 450 trips during the AM peak period and 310 trips during the PM peak period. Volume changes are largely attributed to the re-routing of Subway Crescent cut-through traffic via Dundas Street West and Aukland Road, as well as the traffic activity related to the decrease in on-site parking supply.

Overall Station Area Traffic Volume Changes

Road User	Existing		Future - Option 1		Future - Option 2	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
TTC Buses	-	-	-	-	-	-
MiWay Buses[1]	-	-	182	182	182	182
GO Transit[2]	-	-	20	20	20	20
TTC Parking Users[3]	290	290	110	105	100	85
PPUDO[3]	775	610	775	610	775	610
Subway Cres. Properties[3]	125	150	125	150	125	150
Other / Cut Through[4]	470	340	-	-	-	-
Total	1660	1380	1212	1067	1312	1137

Notes:
1. Based on trasnit program information provided by MiWay.
2. No program information has been provided by Metrolinx for GO Bus usage. It has been assumed for this analysis that 10 inbound vehicles and 10 outbound vehicles would be using the terminal via Subway Crescent.
3. Established through traffic counts at existing properties by BA Group.
4. Volumes that could not be directly traced have been considered 'Other' or 'Cut Through'.
5. Remaining cut through traffic assigned through Aukland Road or Dundas Street West in future conditions.

Subway Crescent

Subway Crescent, under current conditions, connects to existing TTC parking lots, TTC PPUDO facilities, adjacent property parking facilities, and also to Aukland Road. Under both Options 1 and 2, the characteristics of this road will change significantly, as it will no longer connect to Aukland Road, and will not provide access to any Kipling Station parking facilities. It will, however, connect to the new MiWay / GO terminal, as well as provide access to the existing adjacent properties. As a result, overall traffic volumes on Subway Crecent will decrease by approximately 770 trips during at the AM peak period and 550 trips during the PM peak period.

Aukland Road (South of Dundas Street West)

Aukland Road connects to the TTC bus terminal, Kipling Station parking facilities (via Subway Crescent) and provides access to adjacent properties on the east side of Aukland Road and the north side of St. Albans Road.

Under Option 1, the existing connection to Subway Crescent will be eliminated, and along with it, the associated traffic related to parking facilities along Subway Crescent. Aukland Road is forecast to experience a decrease in traffic volumes of approximately 260 trips during the AM peak period and approximately 165 trips during the PM peak period.

Under Option 2, a new connection would be provided from Aukland Road to the new parking and PPUDO facilities via the extension of Acorn Avenue (i.e. similar to Subway Crescent today). The Kipling Station parking supply provided adjacent to Aukland Road would be reduced from current conditions, and therefore, volumes associated with the reduction would be eliminated. Aukland Road is forecast to reduce in traffic activity by approximately five to 15 % during the AM and PM Peak hours.

Subway Crescent (Existing East-West Leg) - Acorn Avenue Extension (Future)

Under existing conditions Subway Crescent extends between Dundas Street West and Aukland Road and connects to TTC parking and PPUDO facilities. The east-west leg of Subway Crescent would be eliminated and / or modified under Options 1 and 2, thus changing the characteristics of this road segment.

In Option 1, Subway Crescent terminates at the proposed bus terminal, and the east-west portion of Subway Crescent is completely eliminated. As a result, volumes would decreased from 570 trips during the AM peak period to 0 and 480 trips during the PM peak period to 0.

Under Option 2, an east-west leg is provided which connects to Acorn Avenue via the PPUDO and parking facility. This leg connects to Aukland Road in a similar manner to Subway Crescent today. Under this condition, the leg experiences traffic volumes during the AM and PM peak hours that are approximately half of the existing traffic volumes experienced at Subway Crescent. Trips would decrease from 570 to 270 during the AM peak period and from 480 to 235 during the PM peak period.

Parking

The current parking supply of 1,465 spaces is provided in three lots and experiences a peak occupancy demand of approximately 99% or 1,448 spaces. Option 1 provides in the order of 1,265 spaces, resulting in a loss of 200 long-term spaces. Option 2 provides in the order of 1,219, resulting in a loss of 246 spaces.

Option 1 would see 294 parking spaces provided on either sides of the Acorn Avenue extension, north of the rail corridor. The remaining balance of the parking, 971 spaces, will be provided in two lots south of the rail corridor.

Option 2 will see 248 spaces provided in-between the Acorn Avenue extension and Aukland Road, north of the rail corridor. The remaining balance of parking, 971 spaces, will be provided in two lots south of the rail corridor.

PPUDO

Option 1 provides in the order of 99 PPUDO parking spaces. 66 of the spaces would be provided in a new short-term parking lot on-site, while 33 spaces would be provided within the existing eastern PPUDO lot. In the future, if demands exceed the supply, an overflow connection has been protected for with the long-term parking lot to the north. Additionally, 6 taxi stand parking spaces are provided within the PPUDO lot.

Option 2 provides in the order 59 PPUDO parking spaces. 26 of the spaces would be provided as lay-by spaces along Acorn Avenue, while 33 spaces would be provided within the existing eastern PPUDO lot. Additionally, 6 taxi stand lay-by parking spaces are provided along the Acorn Avenue extension.

Counts of existing PPUDO demands at Kipling Station would suggest that PPUDO activity currently peaks at approximately 72 vehicles. As a result, only Option 1 provides for enough capacity to accommodate existing, as well as potential future demands considering the overflow connection with the northern parking lot.

4.4 PREFERRED OPTION

The evaluation described in section 4.3 is summarized in the table below. The evaluation criteria described on the left correspond to the priority principles defined at the outset of the work.

Based on this summary, Option 1 was selected as the preferred option and developed further.

PRIORITIES	OPTION 1 DESCRIPTION	OPTION 1 ASSESSMENT	OPTION 2 DESCRIPTION	OPTION 2 ASSESSMENT
1. BUS TERMINAL	Shared GO / MiWay Bus Terminal	○	Shared GO / MiWay Bus Terminal	○
2. PEDESTRIAN ACCESS	Pedestrian path from Subway Cres. to Kipling Stn. and direct pedestrian route from Dundas St and Acorn to transit plaza.	○	Pedestrian path from Subway Cres. to Kipling Stn.	○
3. BUS ACCESS	Bus access from Subway Cres.	○	Bus access from Subway Cres.	○
4. CYCLIST ACCESS	Sharrows along Acorn Ave.	○	Off-road Multi Use Trail along Acorn Ave.	○
5. PLACE MAKING	Clear, formal entrance from Dundas and Acorn leading to new transit plaza at main entrance	○	New transit plaza at main entrance	○
6. PPUDO AND TAXIS	105 parking spaces (99 PPUDO + 6 TAXI)	○	65 parking spaces (59 PPUDO + 6 TAXI)	○
7. PARKING	1,265 parking spaces	○	1,219 parking spaces	○
8. DEVELOPMENT	Some opportunity to develop west of Acorn Ave.	○	Minor opportunity to develop west of Acorn Ave.	○
9. SUBWAY EXTENSION	Pedestrian tunnel to GO platform would interfere with future subway extension	○	Pedestrian tunnel to GO platform would interfere with future subway extension	○

LEGEND

○ VERY GOOD ○ GOOD ○ SATISFACTORY

5.0 KIPLING BUS TERMINAL AND STATION AREA IMPROVEMENTS

5.1 SITE AND TRANSPORTATION CONSIDERATIONS

Following the selection of Option 1 as the preferred Kipling Station Area design alternative, the consulting team has made a number of modifications to further refine and improve the proposed site plan. These refinements are the result of additional detailed analysis work based on site grading, operational needs, urban design considerations, and stakeholder comments. The refinements were related to:

- site grading;
- the PPUDO configuration;
- long and short-term parking lot configuration;
- taxi stand arrangement;
- bicycle route alignment;
- emergency access; and
- site signage plans.

BA Group has assessed the on-site circulation and operation of the revised plan, which functions similarly to the original Option 1 plan that was assessed in the Transportation Operations Study. From an operations and circulation perspective, the revised plan represents an improvement over the original design. Notably, total parking capacity on-site has been reduced by approximately 35% improving circulation.

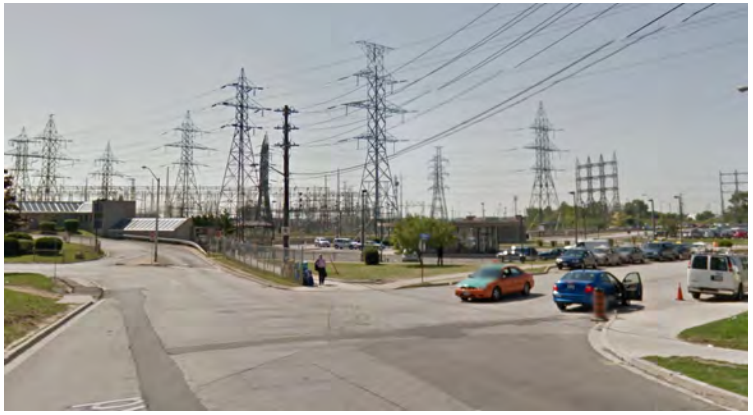
Site Grading

Grading was refined to reflect the operational needs of the station. These refinements include:

- elevating eastern edge of the bus terminal platform to ensure grades within operational tolerances;
- raising the grade around the existing PPUDO to the existing finish floor level in an effort to reduce the slope of the Acorn Avenue extension;
- introduction of retaining walls to accommodate grade changes south of the Bus Terminal as well as at the North edge of the east commuter parking lot;
- shifting the Bus Terminal by approximately 1m to the north to accommodate the retaining walls noted above.

PPUDO Configuration

The configuration of the PPUDO has been refined to improve its safety and circulation. Specifically, it has been lengthened to include a portion of the site west of Acorn Avenue, formerly planned as part of the western parking lot. This configuration increases the PPUDO capacity, considerably improves circulation, while also reducing potential conflicts between vehicles entering the PPUDO from Acorn Avenue, with vehicles accessing these parking spaces from the same drive aisle. The refined plan directs vehicles destined for the PPUDO down Acorn Avenue, directly into the lot and circulates the vehicles around an outside drive aisle, away from the vehicles maneuvering into or out of the PPUDO spaces. Vehicles maneuvering into or out of these spaces will do so within one of seven the north-south drive aisles, away from the circulating vehicles.



Existing View Looking South along Aukland Road



Proposed View Looking South along Aukland Road

The outside drive aisle, despite its one-way circulation, has been designed to a standard of 6 metres in width. This width is necessary to accommodate the parallel parking spaces located along the outer edge of the outside drive aisle, while also providing enough clearance for the alternative access routes. These routes have been protected for in case of an emergency or temporary obstruction within the regular routes, and are discussed on the subsequent page. Additionally, the wider drive aisle provides additional manoeuvring area for vehicles circulating through this high turnover facility.

The proposed reconfiguration will result in an increase of 17 PPUDO spaces over the previous Option 1 plan. The total number of PPUDO parking spaces is in the order of 83. However, the total PPUDO parking supply is in the order of 116 spaces, including the 33 spaces contained within the current PPUDO lot to the east. Despite the minor space reduction, the proposed configuration can accommodate the observed PPUDO peak demand of 72 vehicles, as well as future growth in PPUDO demands on-site.

Parking Lot Configuration

Refinements have been made to the configuration of both the proposed east and west parking lots on either side of the Acorn extension, in addition to a new parking lot south of the rail corridor - resulting in a total parking supply of 1,299 spaces. Specifically, 230 spaces would be located on either side of the Acorn Avenue extension, the existing 829 spaces in the large surface lot south of the rail corridor would be maintained, and an additional 240 spaces would be added to the property located at 915 Kipling Avenue (currently under City ownership and will be transferred to Metrolinx).

In the eastern lot, the parking supply proposed in Option 1 has been reduced by 8 spaces from 172 to 164 spaces, due to minor modifications made to the access and circulation of the lot. As such, the circulation has been reconfigured to a one-way system with dual entry lanes and a single departure lane.

In the western lot, the parking supply has been reduced due to the increased PPUDO size and the addition of a pedestrian walkway connected to the Acorn Avenue sidewalk. The parking supply has been reduced by 66 spaces from 132 spaces to 66 spaces. Additionally, the access points have been reconfigured in order to facilitate a more efficient one-way circulation, while also reducing the level of inbound traffic at the south end of Acorn Avenue that will be associated with the eastern parking lot and PPUDO. Vehicles entering the lot will do so via two entry lanes near the north of the lot from the Acorn Avenue extension. The two queueing lanes will provide adequate capacity in order to accommodate the anticipated vehicular activity levels associated with a parking lot that contains a supply of only 66 spaces. Therefore, queueing spill back onto Acorn Avenue or Dundas Street West is not anticipated to be an issue.

Taxi Stand

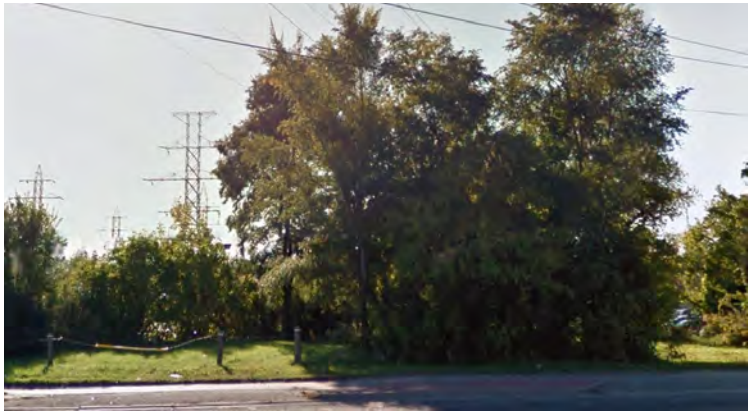
Taxis will be accommodated by a designated queuing area positioned along the northern and eastern edge of the PPUDO parking facility, east of Acorn Avenue. In the order of 13 taxis can be accommodated within the designated queuing area. Taxis are able to easily travel south on the Acorn Avenue extension and circulate around the PPUDO facility and stand in between the main station and north tunnel entrance, to pick up arriving passengers.

Bicycle Route Alignment

Cycling infrastructure along Acorn Avenue has been upgraded from on-street sharrows shown in Option 1 to a one-way curb separate cycling track on each side of the road. The cycle track provides a convenient and direct connection to the non-automotive zone at the south end of the Acorn Avenue extension, with easy access to the provided bicycle parking.

Alternate Access Route

Two alternate access routes (to be used in case of emergency or temporary obstructions in the regular routes)have been provided for within the revised site plan. The first alternate route allows for one-way circulation through the site between Aukland Road and the proposed MiWay / GO



Existing View Looking South at Acorn Avenue and Dundas Street



Proposed View Looking South at Acorn Avenue and Dundas Street

bus terminal. Westbound vehicles would travel through the northern PPUDO parking lot drive aisle, directly across the Acorn Avenue extension and turn into the proposed bus terminal loop. Eastbound vehicles would turn immediately east from the proposed bus terminal through the southern PPUDO drive aisle, cross directly over the Acorn Avenue extension, and proceed to Aukland Road.

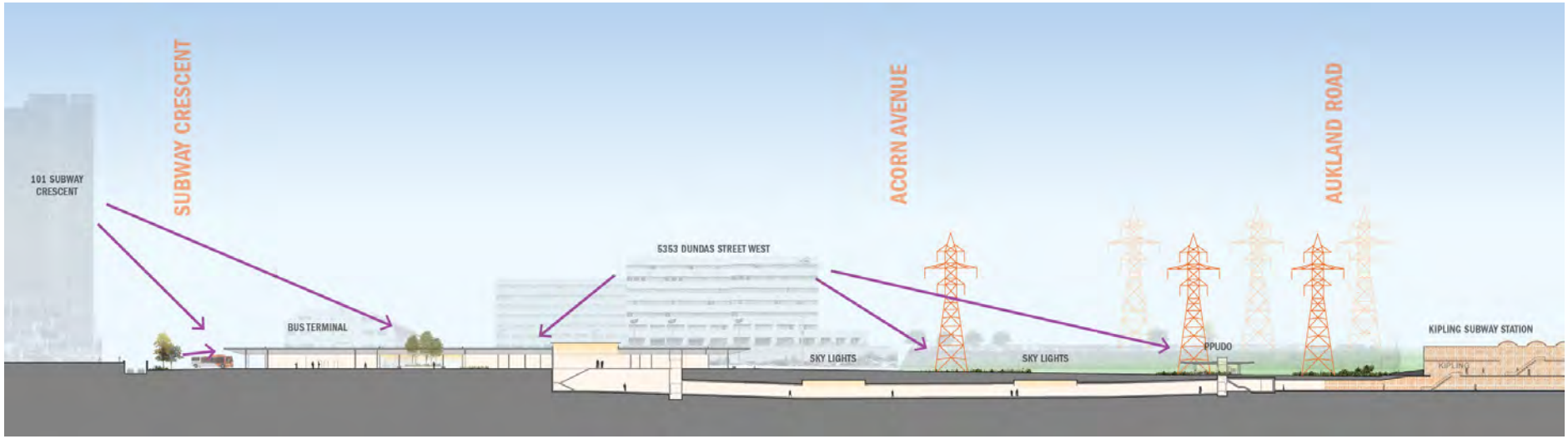
The second alternate route allows for access from Aukland Road through the site, via the Acorn Avenue extension to Dundas Street West or from Dundas Street West via the Acorn Avenue extension to the new MiWay / GO bus terminal.

A copy of the alternate route access plan can be found in Appendix A.

Signage Plan

The proposed signage plan recommends a series of signs intended to reinforce efficient traffic circulation within the site. The proposed signs are placed to indicate Taxi stand locations; these signs will help ensure that taxi operation does not interfere with regular passenger drop-off and pick-up. One-way and Do-Not-Enter signs are strategically situated to enforce one-way circulation in the PPUDO area.

A copy of the proposed signage plan can be found in Appendix A.



Proposed Section Through Bus Terminal and Pedestrian Tunnel



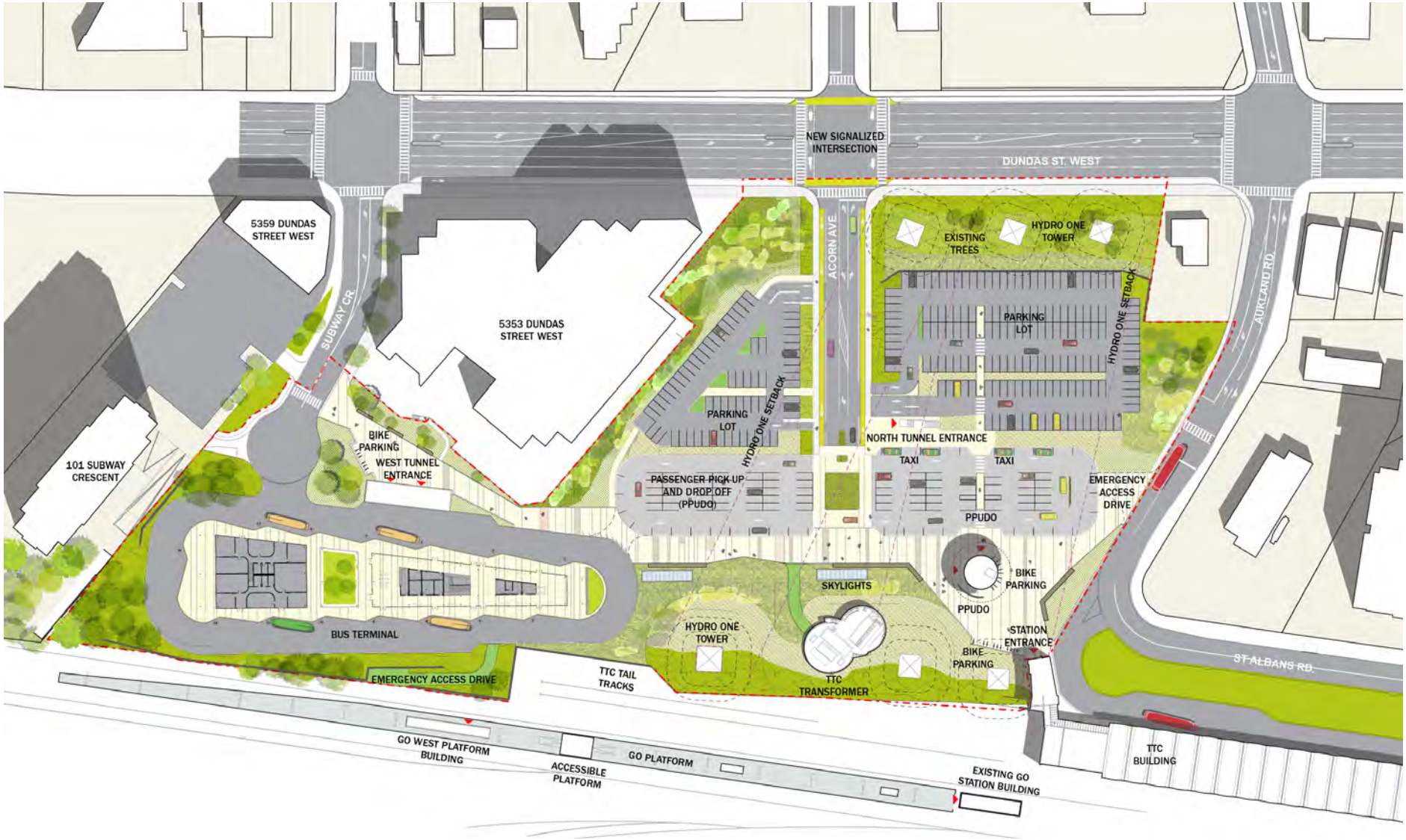
Preferred Station Area Plan: Parking, PPUDO and Taxi



Preferred Station Area Plan: Bus and Automobile Routes



Preferred Station Area Plan: Pedestrian and Bicycle Routes



PREFERRED STATION AREA PLAN



Proposed Aerial View of Bus Terminal and Parking Lot, Looking Northwest

5.2 ARCHITECTURAL DESIGN

Architectural Design Basis

The basis for the architectural design includes:

- Kipling Mobility Hub - Design Concept Development Study, Final Report, by planning Alliance / McCormick Rankin, July 20, 2009.
- 25% Preliminary Design Report for Kipling Mobility Hub by URS, May 28, 2010
- Ontario Building Code 2012
- Record Drawings of Kipling Station provided by Metrolinx
- TTC Design Manuals and Standard and Directive Drawings.
- GO Transit Engineering Standards Manual.
- City of Etobicoke Centre Secondary Plan.
- City of Toronto By-Law No. 1088-2002.
- City of Toronto By-Law Chapter 304 & 320.
- Crime Prevention Through Environmental Design Principles.



Bus Terminal

The proposed Kipling Bus Terminal will provide space for 12 MiWay and two GO Transit bus bays within a new covered structure. Bus layover spaces are included on both the north and south sides of the perimeter circulation drive. The terminal will include a street-level pedestrian entrance on Subway Crescent which will provide accessible connections to both the GO Train platform and the TTC subway and bus stations, via an underground tunnel.

The bus terminal itself has been designed to be a transparent pavilion in a naturalized setting. The roof will be a slender canopy with a wooden soffit. Green plantings on the roof will also mitigate the visual and noise impacts to neighbouring residents and businesses. Skylights over the main ticket hall will help maintain sufficient levels of natural light and ventilation (see illustration of following page). The detailed design should consider an interior finish on the concrete bus terminal walls that is attractive, durable, and easy to maintain, such as a glazed finish or other options.

Under the canopy, the building is divided into two structures: the main Passenger Building in the east and the Service Building to the west. The Passenger Building is enclosed in clear insulated curtain wall glazing in aluminum frames on all sides and houses a service core at its centre. This core includes a small retail space, public washrooms, ticket booth, janitors room, staff rooms and an elevator. The full perimeter is used for circulation. The Service Building will be enclosed in a similar curtain wall system but consist primarily of insulated spandrel glazing panels. Inside the building will house a pair of staff lunch and washrooms (GO and MiWay), dispatch offices, mechanical and electrical rooms, and the boiler room for the GO platform snow-melt system. The detailed design should ensure that the south-facing glazing on the bus terminal will be sufficiently shadowed or screened to prevent overheating in the summer.



Proposed Bus Terminal - Exterior View at the Garden Looking East



Proposed Bus Terminal - Interior View of the Waiting Area Looking Southeast



Existing Parking Lot and Proposed Bus Terminal Site, Looking East from Subway Crescent

The space under the canopy, and between the two buildings, is reserved for a courtyard garden that is open to the sky above. The landscape feature will serve as a waiting area on the bus platform. The sustainable building will be designed to achieve LEED Silver certification.

Tunnels

A fully accessible series of pedestrian tunnels would be constructed including:

- a primary east-west tunnel connecting the new Bus Terminal to the existing tunnel network at the location of the existing PPUDO facility; and

- a north-south tunnel connecting the Bus Terminal entrance at the base of the modified Subway Crescent, the new Bus Terminal and the new West GO Station Building at the existing GO Train platform.

The primary east-west tunnel will include a pair of skylights that will allow natural light into the lower levels. The skylights have been located outside the 15m setback zone required by Hydro One to maintain their overhead infrastructure. The tunnels have sloped floors to align with required grades. All slopes are within standards for accessible circulation. As part of detailed design, special consideration should be given to the finishes and lighting within the new tunnels to provide comfort, interest, and animation. In the east-west tunnel, the design should consider creating special zones under the sky lights.

Modifications to Existing TTC Tunnel

Ensuring a fully barrier-free path of travel between the new Bus Terminal and the existing TTC subway station ticketing concourse will require replacing the stairs currently located between the ticketing concourse and the PPUDO facility with a ramp. Temporary facilities will need to be provided while this area is closed for construction.

Existing Buildings

The work will require significant modifications to a number of existing buildings, including:

Existing TTC PPUDO Facility:

- Introducing an elevator will require creating a new opening for the elevator shaft which will extend beyond the top of the existing roof.
- Raising the grade around the PPUDO facility will require revisions to the exterior stairs around the perimeter of the building;
- Creating a new tunnel to the new Bus Terminal building will require significant excavation and/or mining under the existing foundations (refer to section 5.5 for structural information).

Existing GO Platform Building:

- Refer to Section 6.0

Construction Materials

The following construction materials were assumed for the purposes of the Feasiblity Study. It is anticipated that these will be modified as the design is developed in further detail.

Exterior Glazed Curtain Walls:

- Architectural concrete curb to 200 mm above grade
- Thermally broken, clear anodized aluminum window frames
- Anodized aluminum framing members with silicone butt glazing at vertical joints with horizontal mullion caps.
- Insulated, double-glazed sealed units with low-e coating and U-value

Interior Walls:

- Concrete block

Below Grade Foundation and Tunnel Walls:

- Refer to section 5.7 for structural
- Rigid insulation as required to meet LEED
- Waterproofing
- Concrete foundation wall

Tunnel Floors:

- Crowned and sloped towards the sides of the tunnel at 1%.

Structural Columns:

- Architectural concrete finish

Roof Canopy:

- Planting medium and plant material (refer to section 5.2)
- Drainage layer
- Root resistant protection layer
- Protection board
- Rigid insulation
- Sloped roofing
- Roof structure (refer to section 5.5)
- Textured pre-cast concrete fascia
- Pre-finished wood soffit

Exterior Doors:

- Clear anodized aluminum frames
- Tempered glass

Interior Doors:

- Stainless Steel frames
- Hollow Metal doors with paint finish

5.3 LANDSCAPE DESIGN

The landscape strategy for the station area prioritizes native species to create a naturalized setting for the new bus terminal.

Landscape Architectural Design Basis

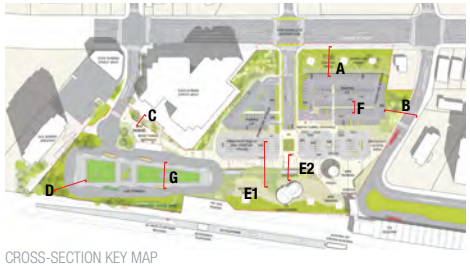
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- 25% Preliminary Design Report for Kipling Mobility Hub by URS, May 28, 2010;
- Ontario Building Code 2012;
- Record Drawings of Kipling Station provided by Metrolinx;
- TTC Design Manuals and Standard and Directive Drawings;
- GO Transit Engineering Standards Manual;
- City of Toronto Urban Design Guidelines for Surface Parking Lots;
- Crime Prevention Through Environmental Design Principles;
- Hydro One policies regarding appropriate plant materials in proximity to hydro infrastructure;
- City of Toronto Wet Weather Flow Master Plan;
- Etobicoke Centre Public Space and Streetscape Plan (2011);
- Metrolinx Design Excellence program; and
- Preliminary detailed design drawings for boulevard details proposed for Dundas Street West (as part of the Six Points Interchange Reconstruction).

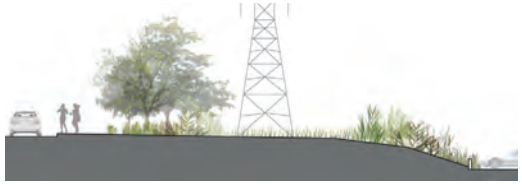
Landscape Strategy

The landscape strategy for the site attempts to take advantage of the site's significant grade changes and irregular geometry by allocating a significant portion of the site to naturalized plantings that surround the new bus terminal. A variety of plant species have been selected to ensure a wide variety of seasonal, height and colour variation. Native species will be employed in an effort to reduce maintenance, and a mix of trees will be planted strategically to provide shade and visual interest, while also meeting Hydro One restrictions on plant species within their easement to protect their transmission lines. The project's landscape material palette should be coordinated, where appropriate and possible, with palette being developed for Etobicoke Centre through the Six Points Intersection project. The slopes and landscaping will be employed to reduce storm water outflow through the strategic placement of a series of swales through the parking areas and along the southern (lowest) side of the site. A net increase in permeable surfaces will be realized across the site. The landscape design should support intuitive wayfinding and any required site signage should be coordinated and integrated into the landscape to minimize clutter and confusion.

The proposed plan aims to improve the surrounding context by enhancing pedestrian access to the existing entrance at Aukland Road and vehicle access to the PPUDO, which will lead to shorter queues and fewer conflicts with TTC buses. If the private property at the southwest corner of Dundas Street and Aukland becomes available for sale, part of it could be used to further improve the pedestrian entrance to the station. The detailed design should consider providing a pedestrian gateway with seating, and potentially public art, at the southwest corner of Dundas West and Acorn Avenue, and also consider using a distinctive paving pattern/treatment that reads as a cohesive element that visually relates to the materials/patterns of the key entry point to the site. Efforts to address potential impacts to 101 Subway Crescent include the provision of a green roof over the bus terminal to improve views from the building, new landscaping to replace existing informal City-owned green spaces, a new West Tunnel Entrance that will provide



CROSS-SECTION KEY MAP



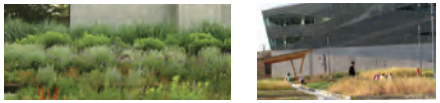
A - DUNDAS ST WEST



Example images of meadow landscape proposed at the north end of the parking lot, at Dundas Street West.



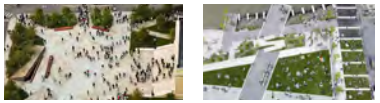
B - AUKLAND ROAD



Example images of the low shrubs and meadow landscape proposed between Aukland Road and the parking lot.



C - MAIN PEDESTRIAN PATHWAY



Example images of major pedestrian zones and route proposed, just east of Subway Crescent.



D - SLOPED LANDSCAPE/BUS TERMINAL BUILDING



Example images of low shrubs and trees and retaining walls proposed for the slope southwest of the bus terminal.



E1 - MAIN PEDESTRIAN PATHWAY



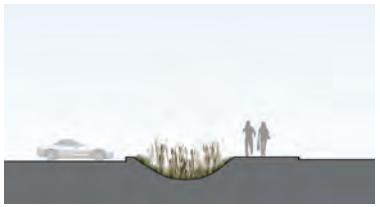
Example images of proposed main pedestrian path with low grasses, near the Hydro towers, above the proposed pedestrian tunnel.



E2 - MAIN PEDESTRIAN PATHWAY/UNDERGROUND TUNNEL



Examples images of proposed main pedestrian path with seat wall benches, above the proposed pedestrian tunnel, with skylight.



F PATHWAY AND SWALES



Example images of proposed bioswale in parking lot to filter and slow down storm water runoff.



G - GREEN ROOF



Example images of proposed green roof on bus terminal, with drought tolerant, hardy species.

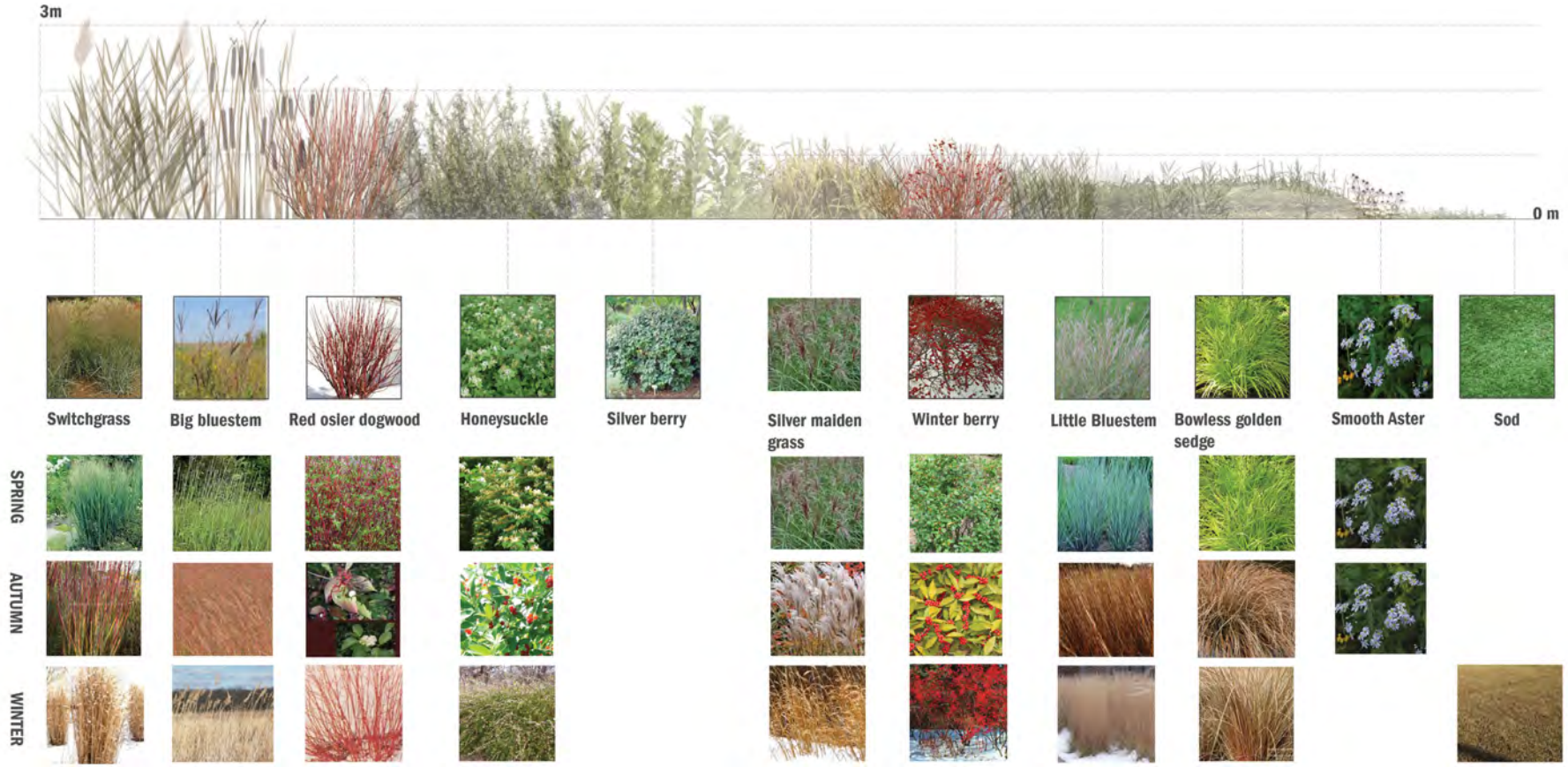
Landscape Strategy - Planting Types

*Landscaping restrictions within the hydro corridor to be confirmed with Hydro One

protected access to the subway station, bus terminal and GO station, and a new crosswalk close to the building entrance.

As part of the detailed design phase, consider using a wider range of native plants to screen retaining walls outside of the HONI easement, such as Staghorn Sumac and Red or White Pine.

Also consider using additional perennials and bulbs along the main pedestrian routes to enhance them and provide interest through out the year. Possible species include strawberry, milkweed, wild columbine, sage, coneflower, sedum, and foam flower.



Landscape Planting Strategy - Proiposed Plant Species

The landscape design consists of the following key elements:

Public Realm

The overall layout of the station area follows the City's latest standards on sustainable site design. Pedestrian and cyclist access will be prioritized, and passenger pick-up and drop-off functions optimized. A total of 57 City of Toronto Post and Ring bicycle parking spaces are provided throughout the site. The detailed design should consider if the bicycle parking proposed next to the West Tunnel Entrance can and should be weather protected. A Transit Plaza located at the base of the refurbished PPUDO facility will provide access for pick-up and drop-off and ample bicycle parking; it will also improve accessibility and offer a well designed public realm for pedestrians. The detailed design should consider the strategic use of permeable paving in the drive aisles of the parking lot and light coloured paving for the bus terminal. It should also consider unifying all pedestrian walkways, including sidewalks on Acorn Avenue, with a similar paving treatment.

Bus Terminal Courtyard Garden

Located at the centre of the new Bus Terminal platform, the Courtyard Garden will rest under an opening in the main canopy roof. Planted with tall, fast growing species like Yellow Birch and Poplars, the garden will offer an amenity for waiting passengers.



Existing Pick-up and Drop-Off Area Looking Southwest



Proposed PPUDO View Looking Southwest

5.4 CIVIL AND UTILITIES DESIGN

Design Basis

The conceptual civil and utilities design was based on the data assembled for the *Kipling Mobility Hub, 25% Preliminary Design Report, Contract No. NC-2007-EN-014 (July 2010)*, specifically Drawings SG-001 to SG-008 and Drawings U-001 to U-007. The data was collected in 2006 and 2007, but the associated methodology and detail has not been ascertained. This data was supplemented with a number of site visits, and meetings and correspondence with Hydro One Networks Inc. (HONI). Additional investigations and individual utility contacts were not undertaken for the purposes of this feasibility study.

The proposed conceptual building and site design presents a number of constraints, summarized as follows:

Subway Crescent and Bus Terminal Building

- The north Subway Crescent portion is to remain at its current elevation to maintain existing driveway slopes and cover to existing utilities
- It is highly desirable to have positive drainage away from the Bus Terminal Building and 101 Subway Crescent;
- Subway Crescent slopes should be maintained at a 5% gradient, particularly due to the significant bus traffic and stopping conditions being introduced.

As a result, the Bus Terminal Building finished floor elevation is generally to be 2m higher than the existing grades. This requires a retaining wall around the perimeter of the bus terminal site, specifically along the TTC tail track and along the CP Rail corridor. A staggered retaining wall is suggested in order to provide a 5% ramp down to the CP Rail track elevations for both CP and GO access. An exception to this grade raise is immediately adjacent to 101 Subway Crescent where there is a local height of land against the wall of the condo building. At present, without 101 Subway Crescent construction drawings, it is uncertain if the local height of land provides a passive loading role. An intermediate retaining support wall is assumed for the purposes of this feasibility study.

It is envisaged that east of the bus terminal roadway, the grades could be sloped to the existing ground elevations, as required to match existing conditions at the TTC Substation Building and south HONI tower bases.

Acorn Avenue Extension and PPUDO Building

- The Acorn Avenue extension should be constructed at a 5% gradient, particularly due to the significant vehicular traffic and the various side entrance and stopping conditions being introduced.
- It is desirable to have positive drainage away from the PPUDO Building (to be noted, PPUDO surrounds are to be raised to slope away from the existing interior finished floor elevation in order to provide a 5% gradient).

As a result, the PPUDO area and associated station area improvements elevations are approximately 1m higher than existing grades. These grades provide level emergency connections between the Bus Terminal roadway and the PPUDO area, and the PPUDO area and Aukland Road. In addition, the area from the West Tunnel Entrance at Subway Crescent to the TTC Main Station Building entrance at Aukland Road results in desirable grades in the 1 – 2 % range.

The grades in the vicinity of the existing TTC Substation and the south HONI tower bases essentially match existing conditions, with swales and catchbasins introduced that drain

westward. In order to provide access to the TTC substation and HONI tower bases, a sloped access road is provided, potentially using reinforced grass pavers.

The west and east parking areas grades are determined by the boundary conditions. The west parking area will need to match the proposed entrance off Acorn Avenue extension, and the resulting grades at the PPUDO and station improvements area, corresponding to a 2m grade raise in the north to a 1m grade raise in the south. The edge treatment along the building at 5343 Dundas Street West, including the aerial hydro plant on wooden poles, needs to be addressed. To maximize parking spaces in the east parking lot, a retaining wall was introduced at the north end adjacent to the north HONI tower bases. The setback was increased to 8m from 5m in recognition of the potential constructability issues with the tower foundations. Also, with the introduction of the retaining wall, the east parking lot elevations can generally match existing conditions.

The proposed conceptual building and site design presents two major considerations for the utility design: changing property ownership which will affect associated utility ownership, operations and maintenance arrangements; and, potential barriers to proposed and existing pedestrian tunnels.

Presently, due to the existing property ownership, utility services are conveniently separated with clear ownership, operation and maintenance arrangements. To be noted, TTC infrastructure and functions are located on City-owned property, but the TTC has operational and maintenance responsibilities.

Consideration of Property Ownership and Associated Operational and Maintenance Arrangements

The following subsections discuss how the changing property ownership arrangements may potentially impact major utilities – water, sanitary, and storm, TTC power supply – due to the proposed conceptual building and site design. Refer to Drawing No. C-010.

Water

Existing site water services are split between City and TTC functions. Currently, there is a 150mm diameter watermain along existing Subway Crescent serving City fire protection responsibilities that feeds fire hydrants at 101 Subway Crescent, and the TTC Substation. This service crosses the existing N-S Pedestrian Tunnel, connecting into a 900mm diameter watermain along Aukland Road, and does not appear to be providing water supply to 101 Subway Crescent. This service needs to be maintained at all times, and will require an additional fire hydrant for the Bus Terminal Building.

From the Main TTC Station Building, fed from along St. Albans Road, there are TTC water service feeds to the existing parking lot booth and Substation. The water service to parking lot booth will be removed, but the service to the Substation will need to be maintained at all times.

It is assumed that the fire hydrant at 101 Subway Crescent will continue to be fed from the east with the connection at Aukland Road, as opposed to connecting to Dundas Street. As a result, depending on the property ownership of Bus Terminal Building and associated area improvements, permanent easements may be required (i.e. City utility easement from Metrolinx). The ownership arrangements for the existing water service connection to the TTC Substation will need to be determined, assuming that operations and maintenance responsibilities will remain with the TTC.

Sanitary

Existing sanitary services presently serve only TTC functions, from the parking lot booth (to be abandoned), and from the TTC Substation (to be maintained). Both of these services connect to a 200mm diameter sanitary sewer that goes under the existing N-S Pedestrian Tunnel into a lift station that releases into an existing 300mm diameter sewer (to be maintained) along Aukland Road.

A proposed sanitary sewer will be required to service the Bus Terminal Building, West Tunnel Entrance Building and the GO West Platform Building, and given the existing site conditions will be required to connect in the east to the existing 300mm diameter sewer along Aukland Road.

Similarly to water, depending on the property ownership of Bus Terminal Building and associated area improvements, permanent easements may be required (i.e. City utility easement from Metrolinx). It is assumed that it is desirable to separate Metrolinx and TTC sanitary services, and as result, a separate sanitary sewer line is proposed from the Bus Terminal Building to the existing 300mm diameter sewer along Aukland Road, as opposed to connecting into the existing TTC 200mm diameter sanitary sewer connection. A portion of the proposed location will be within HONI properties, requiring an easement. The ownership arrangements for the existing TTC sanitary services will need to be determined, assuming that operations and maintenance responsibilities will remain with the TTC.

Stormwater

Currently, stormwater infrastructure serves both City roadway functions, specifically existing Subway Crescent in its entirety, and various TTC functions, such as the parking lot areas and the PPUDO area. The entire site connects into a trunk 900mm diameter storm sewer, east of the existing N-S Pedestrian Tunnel that flows southerly and under the Main TTC Station Building. Recent major storm events have resulted in major flooding at the junction of Aukland Road and St. Albans Road, including the TTC Main Station Building lower level.

Generally, the entire existing stormwater infrastructure will be removed and replaced, except for the trunk 900mm diameter storm sewer, with the northern portion presently located within the HONI easement, and the portion of Subway Crescent that is to remain. It is assumed that Subway Crescent will continue to be drained to the east with a connection to the 900mm storm sewer. Proposed storm sewers will be required to drain the Bus Terminal Building area and surrounds, improvements to the existing station area (including PPUDO Building), Acorn Ave extension, TTC parking lots, and TTC Substation and surrounds (including HONI towers). As a result, depending on the future property ownership, permanent easements may be required and operations and maintenance responsibilities need to be defined.

TTC Power Supply

The TTC Substation is fed from a major concrete-encased 1600mm x 700mm hydro duct, running from the aerial hydro plant feed along the east side of the building at 5343 Dundas Street West, easterly to the junction of St. Albans Road and Aukland Road. This hydro duct appears to be within property owned by the City, with HONI having property rights. The existing hydro duct conflicts with the proposed E-W Pedestrian Tunnel from the Bus Terminal Building to the existing PPUDO Building. Lowering the tunnel to avoid the hydro duct is an option, but in addition to increased construction costs, vertical circulation elements at both the Bus Terminal Building and PPUDO Building would be increased, presenting additional transfer issues between GO/MiWay and TTC facilities. There also would be a conflict with the location of a proposed pedestrian tunnel skylight. With limited potential skylight siting locations due to HONI maintenance clearance requirements, relocation of a portion of the concrete-encased hydro duct has been assumed, noting that power to the TTC Substation Building needs to be maintained at all times. Corresponding ownership requirements, such as easements, will be addressed in future design work.

In summary, subject to the final property ownership, and acknowledging HONI's ownership and rights, the corresponding utilities ownership, operations and maintenance arrangements will need to be addressed in future design work. For the purposes of this feasibility study, separation of Metrolinx, City, and TTC services have been maximized for operational and maintenance arrangements, but easements may be required. Other utilities, such as gas, communications, and low voltage power supply, will be addressed in future design work.

Consideration of Existing and Proposed Pedestrian Tunnels

The second major utility design consideration was conflicts with proposed and existing pedestrian tunnels:

- Existing N-S Pedestrian Tunnel from the existing TTC Main Station Building northerly to PPDUDO Building and the north parking lot entrance building;
- Proposed tunnels, including: from West Tunnel Entrance southerly to the Bus Terminal Building; from the GO West Platform Building northerly to the Bus Terminal Building, and; from the Bus Terminal Building westerly to the existing (but to be modified) PPDUDO building.

These existing and proposed tunnels provide physical barriers for gravity flow and frost depth cover from the west end of the site to Aukland Road in the east. In addition, considering the overall site grading, specifically that the entire site is generally being raised except in the vicinity of the hydro towers and the TTC Substation, the proposed tunnels will be able to be constructed with a higher elevation and at a lower cost, further complicating utility placement.

To facilitate utility placement serving the areas south of the Bus Terminal Building and the existing TTC Substation and south HONI towers areas, two tunnel low points along the proposed E-W Pedestrian Tunnel were developed:

- Approximately 50m from the Bus Terminal Building, a utility corridor was provided for storm, sanitary and hydro crossings with appropriate horizontal and vertical clearances;
- Approximately 40m from the PPUDO Building, the proposed tunnel elevation was lowered to maintain existing water and sanitary services for the TTC Substation Building.

Once north of the proposed E-W Pedestrian Tunnel, the challenge was to traverse the existing N-S Pedestrian Tunnel, while preferably separating existing and proposed Metrolinx and City / TTC utilities. Conceptually, separate corridors were identified as previously outlined, using existing infrastructure to the greatest extent.

Hydro One Networks Inc. (HONI)

As HONI has an easement over most of the study area north of the railway, and also controls the northern part of the site owned by Infrastructure Ontario, collaboration with HONI was undertaken throughout the feasibility study. Requirements were ascertained, and alternatives concepts reviewed and discussed. This feasibility study incorporates those requirements and discussions, and from a utilities, civil and structural design perspective, can be summarized as follows:

- Within 5m of the tower base, no construction or grading revisions are permitted;
- Within 15m of the tower base and a 30m setback along the hydro lines between the towers, the proposed grades and infrastructure must be traversable to allow access for HONI maintenance operations;
- Minimum vertical clearances are 4.5m for the 230 kV lines and 3.0m for the 115 kV lines, but no new structures are permitted;
- All underground works should be located to avoid or must be designed to withstand the weight of heavy construction and maintenance equipment.

It is recognized that excavation or the placement of fill in the vicinity of the towers need to be assessed from an engineering perspective. To be noted, an additional setback for the north HONI towers was provided due to the construction of a 3m retaining wall. Continued collaboration will be required during detail design

Stormwater Management / Low Impact Development Opportunities

During detail design, once the grades and layout has been finalized, and based on additional geotechnical investigation and discussions with Metrolinx and City/TTC operational and maintenance staff, stormwater management and low impact development techniques should be explored. As guided by the City's Design Criteria for Greening Surface Parking Lots and the Wet Weather Flow Management Guidelines (WWFMG), considerations include, but not limited to: bio-swales; on-site retention or flow restriction, and infiltration and exfiltration practices.

As a result of the changes to the land use and property ownership, both quality and quantity control will be required by the City. It is anticipated that quality control would be provided by maximizing overland flow over vegetated areas and using oil/grit separators. This is considered appropriate given the relatively small catchment areas associated with the overall site.

For quantity control the 5-year post-development flows are to be restricted to the 2-year pre-development flow. This only applies to the areas where the imperviousness is being changed as a result of the new development. Subject to design calculations, in order to provide the required flow attenuation, the use of both surface and subsurface storage may be required.

Guiding Design Documents

The following general functional criteria and operational requirements were used to develop the conceptual design for this feasibility study:

- Meet Metrolinx/ GO Transit Design Requirements Manual (DRM) and MiWay Transit program requirements;
- Where applicable, comply with TTC design requirements;
- Comply with all applicable City of Toronto standards;
- Apply sustainable best practices, including Toronto's Green Standards and WWFMG;
- Comply with identified HONI requirements;
- All facilities associated must maintain proper horizontal and vertical clearances from identified utilities.

Scope of Work Summary

The following sections summarize the identified civil and utilities scope of work for key areas of the overall site (also refer to Drawing Nos. C-001 to C-012):

- Subway Crescent (portion to remain)
  - Integrating into new storm sewer system
  - Maintain at all times existing watermain and fire hydrant at 101 Subway Crescent
  - Maintain at all times street lighting
  - Reconstruct roadway and sidewalk, including streetlighting, due to alignment shift, but ensuring that driveway grades are not affected
  - Modified signal timings (no infrastructure modifications assumed)
- West Tunnel Entrance
  - Sanitary connection for elevator pit sump
  - Power and communications provisions
  - Potential water supply for a sprinkler system (not assumed for the purposes of this feasibility study)
  - Ensure provision of utility corridor with sufficient width between the building at 5343 Dundas Street West (property lines to be confirmed, and other utility requirements to be determined during detail design – an allowance for 6m has been provided for this purposes of this feasibility study)
- Bus Terminal Building
  - Sanitary connections for washrooms, maintenance rooms, elevator pit sump, etc.
  - Gas for boiler room and GO platform snow melt system
  - Power and communications provisions
  - Water supply for washrooms, maintenance rooms, etc.
  - Potential water supply for a sprinkler system (not assumed for the purposes of this feasibility study)
  - Integrating into new storm sewer system
  - Power for site lighting
  - Retaining walls required due to grade raise along rail corridor and TTC tail track (should be designed to take bus impact and with appropriate security fencing)
  - Provide retaining wall along 101 Subway Crescent (subject to detail design)
  - Rail corridor access road provided for CPR and GO maintenance purposes
  - Provide for temporary access road between bus terminal roadway and the PPUDO area

(pavement structure to address increased loads, provide drop curbs and removable bollards)

- GO West Platform Building (including pedestrian access tunnel)
  - Power and communications provisions (from the Bus Terminal Building)
  - Sanitary connection for elevator pit sump (from the Bus Terminal Building)
  - Snow melt system (from the Bus Terminal Building)
  - CP Rail coordination required (available track outages and potential for construction access route along the north spur track)
- GO Platform
  - Power and communications provisions (from the Bus Terminal Building)
  - Platform to be reconstructed to existing dimensions with snow melt system (from the Bus Terminal Building)
  - Electrification grounding and bonding provisions have not been assumed
  - CP Rail coordination required (available track outages and potential for construction access route along the north spur track)
  - Provide mini-platform and shelters as per GO DRM (note HONI will not permit a continuous canopy within their easement)
- Existing GO Station Building (including underground connection to TTC lower level)
  - Power and communications provisions (from the Bus Terminal Building)
  - To be confirmed during detail design, whether water and sanitary services are separate (defined demarcation for operations and maintenance purposes), or combined with existing TTC services (if the former, challenge will be to traverse both the TTC tail tracks and the proposed E-W Pedestrian Tunnel)
  - Water supply for washrooms, maintenance rooms, etc.
  - Potential water supply for a sprinkler system (not assumed for the purposes of this feasibility study)
  - Sanitary connections for washrooms, maintenance rooms, elevator pit sump, etc.
  - CP Rail coordination required (available track outages and potential for construction access route along the north spur track)
  - Envisage secant walls with rail trestle to maintain spur line operations during construction
  - TTC coordination required for connecting into both the lower level and the existing pedestrian tunnel crossing the rail corridor
- Public Realm and Station Area Improvements (including proposed E-W Pedestrian Tunnel)
  - As previously outlined, two utility corridors along the proposed E-W Pedestrian Tunnel are provided: a west corridor for storm, sanitary and hydro crossings; and, an east corridor to maintain existing water and sanitary services for the TTC Substation Building.
  - Associated with the west corridor, will be a tunnel low point with a mechanical room with a sump pit to drain the proposed E-W Pedestrian Tunnel (a maintenance hole access is recommended to be provided into the mechanical room for ease of future pump access)
  - Power and communications provisions (from the Bus Terminal Building)
  - Water supply for fire protection purposes (fire hydrant required to provide coverage on the east side of the Bus Terminal Building)
  - Potential water supply for a sprinkler system (not assumed for the purposes of this feasibility study)
  - Surface lighting
  - Provide access to existing TTC Substation and the south HONI tower bases elevations, with capability to handle heavy maintenance equipment
- TTC Substation and South HONI Tower Area
  - No major grading changes, swales and catchbasins to be introduced draining to the west to the proposed storm sewer crossing of the E-W Pedestrian Tunnel
  - Sanitary and water supply connections from the TTC Substation to be maintained / replaced and possibly insulated (to be operational at all times)

- TTC Main Station Building and Existing Tunnels
  - Scope of work to be determined during detail design (refer to Existing GO Station Building)
- PPUDO Building and Surrounds
  - Maintain at all times existing watermain and fire hydrant (also serving TTC Substation)
  - Potential water supply for a sprinkler system
  - Sanitary connection for elevator pit sump
  - Power and communications provisions
- North TTC Parking Lot, PPUDO Area and Acorn Avenue Extension
  - Surface lighting
  - Power and communications provisions, including addressing parking entry gates and Closed-Circuit TV (CCTV)
  - Integrating into new storm sewer system, and incorporating stormwater management and low impact development techniques (to be noted, during detail design, drainage calculations will confirm the storm sewer system downstream capacity at Aukland Road – if potential on-site storage is required, an underground storage tank could be provided in the north parking lot)
  - Signalized intersection addition at Acorn Avenue, including relocation of Toronto Hydro poles along Dundas Street
  - Modified signal timings at Aukland Road (no infrastructure modifications assumed)
  - Modifications to the existing north entrance from the existing N-S TTC Pedestrian Tunnel in order to match proposed elevations
- New parking lot located at 915 Kipling Avenue
  - Removals and grading, including building demolition
  - Storm sewer system adopting stormwater management techniques
  - Surface lighting
  - Power and communications provisions, including addressing parking entry gates and CCTV.
- North HONI Tower Area
  - No major grading changes, overland flow to Dundas Street to be maintained

Additional design considerations include:

- Focus has been on the major utilities, that offer horizontal and vertical clearance issues, and require resolution of ownership, operations and maintenance arrangements;
- Due to various constraints, the overall site will be significantly raised – maintenance holes to remain will require 1m to 2m adjustments, potentially necessitating the addition of safety platforms and ladders;
- Staging and phasing will be complex and requires resolution during detail design, but it is envisaged that temporary utility works will be required to ensure existing operations are maintained at all times for key infrastructure.

Future Actions

The following are key future actions to facilitate detail design:

- In association with property ownership and associated rights negotiations, appreciate and resolve utility ownership, operations, and maintenance arrangements, as they will likely require easements as a minimum
- Major utilities – water, storm and sanitary – require pressures and capacities to be confirmed, particularly in light of note downstream flooding events
- Undertake Subsurface Utility Engineering (SUE) investigations
- Undertake appropriate geotechnical investigation and testing if incorporating stormwater management and low impact development techniques are to be maximized
- Engage all utilities to confirm requirements and applicable approvals (to be noted, both gas and additional power supply availability to be confirmed)
- Resolve all demarcation, utility, and constructability issues between the TTC Main Station Building lower level and the Existing GO Station Building
- Continued CP Rail discussions to: finalize retaining wall and access road details;

construction requirements within the rail corridor including associated track outage requirements; utilities within the rail corridor such as fibre optics

- Continued HONI collaboration.

5.5 STRUCTURAL DESIGN

Design Basis

Applicable Codes and Standards

The bus terminal building will mainly house GO and MiWay customers and employees, along with service equipment. The 2012 Ontario Building Code (OBC) classifies structures of this type as 'normal' importance. Design environmental loading data for Etobicoke will be as per Supplementary Standard SB-1. Additional requirements included in the User's Guide – NBC 2010 Structural Commentaries (Part 4 of Division B) will be considered.

Structural Systems

The proposed building structure for the bus terminal building is a bi-directional structural moment-resisting steel frame system composed of girder trusses along the building's N-S and E-W main supporting lines and steel joists along the (building) E-W direction supported on round HSS steel columns. The roof girder trusses cantilever out to provide support for the canopy extending to the outside edges of the bus platform.

Foundations

The building structure is assumed to be supported mainly on strip and spread footings. No geotechnical report is available to determine the soil bearing capacity.

Shoring for Excavation

Shoring will be required for the construction of the pedestrian tunnel and GO West Platform Building, and for the existing GO Station Building connection to the TTC Main Station Building. It is envisaged to use concrete caisson walls to address railway loading. The shoring walls will be used to facilitate and expedite the construction and installation of the precast west tunnel in segments, and providing sufficient construction windows for the existing GO Station Building and associated underground works.

Pedestrian Tunnel

Pedestrian tunnels will be constructed using a combination of precast concrete (PC) tunnel segments and cast-in-place concrete (CIP) tunnel segments. PC tunnel segments will be used directly under the existing train tracks, and cast-in-place construction will be used elsewhere. The use of this hybrid system is dictated by the construction sequence and operational requirements of the train track outages. Tunnels will have a slab-on-grade to accommodate the placement of services beneath it, as well as for sloping floor finishes to drains.

Slab-on-Grade

The slab-on-grade for interior spaces will be 150 mm thick concrete slab reinforced with mesh reinforcement. The slab on grade will bear on well-compacted, granular graded fill. There will be a need for well-compacted engineered fill to raise the site's grade. Sawcuts and control joints will be used to control shrinkage cracks. An allowance for a thicker slab will be made for equipment which will require bases to support larger loads, displacements, and drainage or vibration control.

Exterior Spaces

The exterior slab-on-grade will be constructed with a 200 mm thick concrete slab reinforced with reinforcement on both faces. The slab will bear on well compacted granular graded fill.

Sawcuts and control joints will be used to control shrinkage cracks. There will be a need for well-compacted, engineered fill to raise the site's grade.

Columns

The main building will typically be supported by round steel (HSS) columns, sized for gravity loads and bending moments resulting from frame action due to lateral wind and/or seismic loads.

Roof Structures

The proposed roof structure for the bus terminal building is a structural steel system consisting of steel girder trusses and joists supported on round HSS steel columns. The roof deck will consist of 76 mm deep steel deck; acoustic deck shall be provided for interior spaces. Exterior cantilevers will have steel deck to create the soffit. The roof girder trusses and joists will vary in depth in proportion to their span, size and spacing to be determined. The roof structure will be designed for gravity loads (including: roofing, finishes, green roof, basic snow, snow drift, rainfall ponding, and an allowance for small equipment), as well as diaphragm shear forces originating from lateral loads.

Lateral Load Resisting Elements

Lateral wind and earthquake loads will be resisted by a combination of steel moment resisting frames, and/or cross-bracing in both directions, as well as shear walls in elevator and stairwell cores.

Building Code Requirements

Gravity Loads

All structural elements will be designed to resist the loads meeting or exceeding the requirements and allowances specified in the 2012 Ontario Building Code. Structural elements supporting rail tracks will be designed to resist the loads specified in the AREMA Manual for Railway Engineering.

Wind Loads

The design wind loads will be based on pressures and parameters recommended in the 2012 Ontario Building Code. Hourly wind pressures of 0.40 kPa will be used in the design of structural members for strength and deflections. This pressure represents reference velocity pressures on probabilities of being exceeded 1 in 50 years for strength and for serviceability. Importance factors of 1.0 will be used for ultimate limit states, and 0.75 for serviceability limits states.

Seismic Loads

The structure will be designed to withstand the seismic forces assigned to a normal importance building category with an importance factor Ie= 1.0. Seismic data taken from the Ontario Building Code and used for design is as follows: Sa (0.2) = 0.21, Sa (0.5) = 0.12, Sa (1.0) = 0.065, Sa (2.0) = 0.021, PGA = 0.110.

Structural Design

Structural design will be undertaken using the Limit States approach in accordance with the Ontario Building Code and applicable referenced standards. ULS will be used for strength design; SLS will be used for serviceability checks.

Serviceability Requirements

Serviceability requirements will be checked against the requirements specified in the Ontario Building Code and all other applicable reference standards including Canadian Standards Association (CSA) Standards A23.3 Design of Concrete Structures and S16.1 Limit States Design of Steel Structures.

LEED Strategies

Strategies related to LEED (Leadership in Energy and Environmental Design) rating for building structures centre around maximizing recycled content, minimizing construction waste and total elimination and/or significant reduction in the use of materials containing VOC's, and designed to accommodate future flexibility in design.

5.6 MECHANICAL DESIGN

Design Basis

The Heating, Ventilating and Air Conditioning (HVAC) system, plumbing and drainage system, and fire protection system described herein outlined the minimum provisions required, as per relevant Codes and Design Standards, including but not limited to: Ontario Building Code (OBC) 2012; National Fire Protection Association (NFPA) Standards; American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standards; Ontario Fire Code; CSA Codes and Standards; GO DRM.

The mechanical systems design will be driven by energy efficiency and sustainability considerations. All aspects of the mechanical building services equipment and systems will incorporate energy efficiency concepts wherever possible and appropriate. The mechanical system selections as well as individual product selections will be based on the most energy efficient equipment available that meets the required function and performance at a reasonable cost.

Sustainability

An integrated design approach should be adopted to ensure that cost-effective trade-offs are made in the selection of architectural materials and mechanical / electrical system selection.

HVAC Design Criteria

Outdoor Design Conditions

- Summer: 30ºC DB / 23ºC WB
- Winter: -19ºC

Indoor Conditions

- General Areas
  - Summer: 24ºC + / - 1.5ºC, Max 60% RH, No active humidity Control.
  - Winter: 22ºC + / - 1.5ºC, Min 30% RH, No Minimum humidity will be controlled.
- Other non-air conditioned areas (Unoccupied areas)
  - Summer: Ventilation only
  - Winter: Min 15ºC

HVAC System

The HVAC system selection process included a detailed review of the pros and cons of several different HVAC systems and technologies (such as geothermal heat pump system; rooftop unitary equipment; centralized hydronic heating and direct expansion cooling plant with high efficiency heating water boilers, air-cooled condensing units; and, split type, variable refrigerant flow (VRF) heat pump system complete with hydronic). Regardless of the system type chosen for this project, all cooling equipment will use CFC & HCFC free, ozone friendly HFC type refrigerants. To optimize the energy use for HVAC systems, application of air-side economizers, energy recovery systems, demand control ventilation and direct digital control type building automation system will be considered in the design.

Plumbing and Drainage

Storm Drainage

The building storm drainage system will use conventional flow roof drains, rain water leaders, piped and drained to the underground municipal drainage system.

Sanitary Drainage

The sanitary system will drain all fixtures by gravity wherever possible. The possibility of including a grey water system for irrigation purposes as well as rain water harvesting for water closets will be evaluated at the design stage. Where elevations make gravity systems impractical, the sanitary

drains from the fixtures will be piped to a sump and pumped to a level where gravity drainage is possible.

Plumbing Fixtures

All plumbing fixtures will be low flow style fixtures. Fixtures with flow rates less than that mandated by the Ontario Building Code will be used wherever possible.

Domestic Cold Water System

The domestic water system will connect to the City's water supply system. The plumbing system will meet all codes and standards and local municipality requirements. Premise backflow prevention will consist of a reduced pressure principle backflow preventer. Piping will distribute the water throughout the building and connect to all plumbing fixtures.

Domestic Hot Water System

Domestic hot water will be provided by natural gas fired instantaneous hot water heaters. Hot water will be piped to all plumbing fixtures requiring hot water. A domestic hot water recirculation system will be included in the mechanical design.

Sprinklers: Bus Terminal Building

Subject to the detail design phase, the station building may be protected by a wet automatic sprinkler system in accordance with the requirements of the Ontario Building Code. The system will be installed to NFPA 13 requirements. All areas with ceilings will use concealed style sprinkler heads. Areas without ceilings will use upright style sprinkler heads. The sprinkler system will use the municipal water supply. A single connection for both the sprinkler systems and the domestic water system will be used if allowed by the municipality.

Fire Extinguishers

Fire extinguishers will be located throughout the building to meet the requirements of the Ontario Fire Code. In finished areas, extinguishers will be installed in recessed fire extinguisher cabinets. In unfinished areas, extinguishers will be mounted on the wall with suitable wall mounting hooks or surface mounted fire extinguisher cabinets.

Building Automation System

A Direct Digital Control (DDC) Building Automation System (BAS) will provide integrated temperature and humidity control and energy management control and monitoring of the mechanical and electrical systems. The BAS will consist of a commercial grade, micro-processor and web based system using BACNet open protocol. The system will control and monitor all mechanical and electrical equipment. The system will be a state of the art, web based control system. The system will provide the following functions: temperature control; automatic time scheduling of equipment; equipment status monitoring; trending of key operating parameters; alarm condition reporting; monitor selected electrical systems; monitor emergency generator system, if applicable; and measure and monitor energy use including water, natural gas, and electrical power.

Scope of Work

The work covers the supply, installation, connection, testing and commissioning of mechanical systems for the new Bus Terminal Building, West Tunnel Entrance, platform and tunnels, PPUDO modifications, and the GO West Platform and existing GO Station Buildings.

5.7 ELECTRICAL DESIGN

Design Basis

The electrical design shall be based on providing the following features at the most economical cost, considering both investment and operating expenditures:

- Safety to personnel during operation and maintenance
- Ease of maintenance for equipment maintained by non-specialized personnel
- Flexibility and reliability of electrical services
- Proper coordination for all elements of the system as to:
    - Arc Flash levels
    - Insulation levels
    - Interrupting capacities
    - Protective relaying
    - Mechanical strength
- Energy conservation with respect to system and equipment and their operation.

Codes and Standards

Design to meet GO DRM requirements and equipment, material and installation to be in accordance with the latest edition of the applicable standards of the following codes, and regulatory agencies:

- Canadian Standards Association (CSA)
- Ontario Building Code (OBC)
- Ontario Electrical Safety Code
- Local regulatory bodies having jurisdiction over such installations.

Scope of Work

The work covers the supply, installation, connection, testing and commissioning of electrical systems for the new Bus Terminal Building, West Tunnel Entrance Building, platform and tunnels, PPUDO modifications, and the GO West Platform and existing GO Station Buildings' power supply, illumination and auxiliary systems, as follows:

Platform Modifications

- New lighting poles, luminaires and shelters
- Removals of existing lighting poles and luminaires
- Light pole foundations
- Lighting, power and communications systems
- Underground duct and wiring
- PA, CCTV and security and fare system upgrade
- Grounding

Building Structure

The new station buildings, tunnels, stair/elevator enclosures, canopies and shelters interior illumination, electrical and communications systems, including:

- Lighting fixtures, controls and switches
- Interior power and communications conduit systems and wiring
- Grounding
- Power distribution
- Wiring and devices for elevators, pumps, heat tracing and ventilation system
- Electric heaters

- Public Address (PA), Closed-Circuit TV (CCTV), security and fare system
- Electric heat tracing
- Boiler room
- Grounding

Emergency Power

The emergency power supply system including generator and uninterrupted power supply (UPS) provisions, emergency lighting system, exit lights, conduit and wiring.

Sustainability

The following sustainable design strategies are proposed:

- Quality and durability: longer-lasting and better-functioning products will have to be replaced less frequently, reducing the impacts of producing replacements
- Providing appropriate lighting illumination, lighting distribution and avoidance of glare
- Providing ability to control the amount and direction of light
- Enhancing the visual definition of the space
- Providing appropriate and relevant distribution of lighting within the spaces
- Developing a strategy employing both ambient light and task lighting
- Specifying lamps with colour rendering index > 75
- Specifying LED lighting system
- Specifying electronic ballasts (where LED lighting is not available)
- Selecting fixtures which minimize direct glare
- Minimizing brightness differences
- Specifying systems with advanced optical systems and efficient reflector materials
- Lighting controls using a mixed approach to lighting control providing manual switching to users, providing separate switching in all daylight zones, using day lighting sensors to control lighting.

Energy Efficiency

Electrical design shall incorporate energy efficient products to limit energy consumption. Equipment, electrical distribution and conversion equipment shall be selected with consideration to energy efficiency. The main products identified are light fixtures (lamps, reflectors, ballasts) and transformers.

Energy Conservation

Energy conserving equipment shall be included in the design as practical to reduce energy waste. The main products identified are photocells, programmable timers and occupancy sensors.

Power Quality

The electrical distribution system shall be designed to maintain a level of power quality within the system to allow for the proper functioning of motors and electronic equipment. Voltage drop shall be kept to within acceptable levels and equipment shall be selected to keep harmonic current and voltage levels at a minimum. Where indicated, harmonic mitigating equipment shall be considered. Surge suppression and waveform filtering devices shall be installed at various locations to give multiple levels of protection as follows: service entrance, distribution panels, lighting panels, motor control centres, and at sensitive electronic equipment. Power factor correction shall be provided at the service entrance equipment.

Reliability shall be increased by selecting equipment that allows for proper coordination of devices. Short circuit currents shall be calculated at all nodes and breakers shall be selected so as provide adequate characteristics for coordinating downstream devices.

Power Distribution

Incoming power supply points and load calculations to undertaken during detail design. Utility metering shall be provided suitable to Toronto Hydro requirements. Metering CT's and PT's will be

located in the main switchboard utility metering compartment. A telephone connection shall be provided for remote monitoring by Toronto Hydro.

Main Power Service

The bus terminal building's main service entrance shall be provided with a main service entrance breaker, utility metering compartment and service entrance switchboard. Two automatic transfer switches shall be fed by a back-up power diesel generator to feed the lighting and distribution switchboard, which will feed all essential loads during power outages. The estimated size of the generator is 300kVA.

The main disconnecting means for the service entrance shall be a fixed, cubicle mounted, insulated case circuit breaker, complete with digital solid state trip adjustments. The breaker shall be continuously rated for 100% of its maximum trip plug. The breaker shall have ground fault protection and adequate short time withstand rating to allow for proper coordination with downstream devices.

The proposed bus terminal building will have a sub-electrical room to distribute power to local loads. Feeders for normal and emergency powers (generator and UPS) will be run from the main electrical room on the south side to the proposed station building into distribution panels to feed all loads on the north side.

Feeders will distribute out to panelboards, which will branch out to individual loads. Load center equipment will be located in the electrical or sub-electrical rooms within the building and the site. The Electrical and Sub-Electrical Rooms shall be 1-hour fire rated as required. All electrical equipment shall be sprinkler-proof to prevent failure due to water damage from fire protection sprinklers.

Distribution Transformers

Distribution transformers shall be provided to step-down the voltage to utilization voltage. Transformers shall be located in electrical rooms within the building.
Distribution transformers shall be dry type, isolation, air-cooled, natural circulation (ANN), indoor, sprinkler-proof complete with electro-static shielding to reduce propagation of high-frequency transients, 220 degree C insulation with copper windings.

Transformers shall be designed to have 150 degree C temperature rise.

Transformers shall be UL listed for a K-factor of 13. Where a general purpose type transformer is specified it shall meet the energy efficiency requirements for C802.2 – "Minimum Efficiency Values for Dry-Type Transformers".

Panelboards

All panelboards are to be suitable for bolt-on full size breakers and complete with full capacity copper phase, neutral and ground buses. Where required to suit the nature of the load, panelboards shall be complete with oversized neutral buses suitable for K-factor 13 loads. Separate panelboards shall be provided for lighting, receptacle and miscellaneous mechanical and building system loads. Other load centres, such as the Communications room, shall be provided with dedicated panelboards.

Coordination Study

A complete ground fault, arc flash and coordination study should be performed during detail design. A preliminary coordination study shall be carried out during detail design as well to assist with selection devices and distribution options. A complete coordination study shall be carried out as part of the contract and used to set and adjust devices to achieve a fully coordinated system.

Emergency Power

To be confirmed is the location for one (1) outdoor, diesel fuel powered, back-up emergency generator that will be able to carry all the bus terminal building's essential loads. The generator shall be housed in a weather resistant, sound attenuated enclosure. The building generator shall be sized to carry the entire building load as per the GO DRM so the facility can operate during sustained power outages without any adverse effect on operations. Upon loss of normal power, the emergency power systems shall initiate the starting of the generator and the transfer of the loads. The diesel powered back-up generator shall be independent complete with its own fuel supply. The generator fuel tank shall be sized for 24 hour operation at full load and shall be of double wall construction. The exhaust shall be provided with hospital grade silencer equipment. The installation shall meet Ministry of the Environment (MOE) requirements for air and noise requirements.

Lighting Systems

Lighting systems are to be designed to maximize visual comfort, efficiency, economy of installation, safety and ease of operation and maintenance. Luminaire type, style, lamp source, shielding, reflector, mounting and lighting levels shall comply with the latest edition of the Illuminating Engineering Society of North America (IESNA) for each specific area of usage and American standard for Office Lighting where cathode ray tube (CRT) type display screens may be used. Light levels to conform to the GO DRM.

Luminaires shall be selected to be energy efficient including the use of energy efficient LED's, high efficient lamp/ballast combinations, mirrored reflectors and high overall efficiency for the space and/or task being lit. Light levels shall be defined for the general area and the task area. The lighting shall be either wall, ceiling mounted or mounted at the task area configured to most effectively provide the required illumination.

Luminaire layout and mounting to be compatible with ceiling systems specified and security requirements for each specific area.

Emergency Powered Lighting

All lighting will be connected to the emergency power system through the buildings distribution system. Emergency lighting fixtures will be selected strategically throughout the building to meet code requirements as emergency lighting. Lighting on the platform will be powered from the emergency generator supply. At least 30% of the parking lot lighting shall be on the emergency generator supply.

In addition to the emergency powered lighting described above, unit equipment powered, battery-backed up lighting units shall be provided in all service rooms for personnel safety. The battery back-up lighting system shall be designed to provide immediate illumination upon loss of normal lighting within an area. A light level of 10 lux minimum shall be provided throughout the boundary of any area identified above. The battery unit shall be sized to provide 1/2 hour of continuous back-up. Battery units shall be powered from the same circuit of respective area lighting.

Outdoor Lighting

Outdoor lighting shall be provided throughout the site to appropriately light: roadways, walkways, building entrances, building perimeters, parking lots, including the new parking lot at 915 Kipling Avenue, PPUDO area, platforms and signage.

Exterior lighting to be glare free and facilitate safe movement within designated areas.

All exterior lighting shall be fed at 347V except for platform lighting which shall be at 120V. Dimmable LED lighting shall be utilized throughout for the exterior lighting.

Light standards shall be 12.0m and 6.0m high lighting standards, but also adhere to HONI height

restrictions, used to illuminate roadways, PPUDO, platforms and parking areas. These luminaries shall provide illumination levels as per GO DRM.

The maximum to minimum illumination ratios shall meet or exceed the IESNA standards and as per GO DRM. Lighting shall take into account the special requirements of closed circuit video surveillance equipment.

The lighting fixtures shall use full cut-off optics to eliminate stray light above the zero degree access and stray light beyond the property line.

The existing lighting shall be re-fed from the new electrical room in the proposed utility building. The lighting standards located around the PPUDO area and adjacent to the existing station building shall be replaced or relocated to suit the new configuration. Lighting shall be added as required. Exterior lighting control shall be provided as per GO DRM.

Wiring Devices

All wiring devices to be at minimum industrial specification grade. Computer receptacles to be wired with dedicated neutral. Isolated ground receptacles to be provided where required.

Communications Rooms

A main communications room to be provided with a dedicated UPS system with 30 minute back-up and dedicated panelboard in utility building. The station building will have a sub-communications room with space for three racks and dedicated panelboards. UPS is to be located in main electrical room. UPS panels are to be provided in main and sub communications rooms. The main communications room is to be outfitted generally as per GO DRM standards.

Underground ducts for the connection to local telephone service providers will be run from the Building to the property line.

CCTV Systems

A CCTV system shall be provided. Cameras shall be provided on the platforms, the PPUDO area, parking lots and inside all new building as per the GO DRM.

Security Systems

A security system shall be provided for the facility and monitored by CHUBB. Security system shall include door contacts, motion sensors, temperature sensors, station power failure, generator alarms, UPS alarms, sump/sanitary pump alarms and access control as a minimum.

Building Raceways

Empty raceway systems shall be provided throughout the building to suit the wiring requirements of other building systems. Raceways shall be either totally enclosed or open to suit requirements. Raceways shall be properly grounded and provided with all necessary pull boxes, pull wires, bushings and supports.

Telephone Infrastructure

A bell telephone service shall be provided consisting of 2-103mm diameter, concrete encased ducts and shall be provided from the main communications room to the service pedestal to Bell Canada requirements. A 50 pair CAT 6 communications cable and a 24 strand fibre optic cable shall be provided for IT and telecommunications systems. The system shall include the red-phone system, pay-phone system, ticketing systems and security system.

Public Address System

A public address system shall be provided as per the GO DRM requirements. The PA system shall be tied into the new ticket booth red phone.

Fare Collection Systems

New fare collection systems shall be provided including new ticket vending machines and PRESTO fare collection equipment. Assume all new devices.

Passenger Notification System

New passenger notification system (LED signs) for the platform, bus loop, tunnels and station building shall be provided to GO DRM requirements.

Synchronized Clock System

A new synchronized clock system, including a new station clock, shall be provided in the station building to the GO DRM.

5.8 ELEVATOR DESIGN

Design Basis

- GO Design Requirements Manual guidelines for elevators
- Metrolinx Outline Specification (April 30, 2012)

The project requires five new elevators:

- West Tunnel Entrance
- New Bus Terminal;
- New West GO Building;
- Existing PPUDO Building; and
- Existing GO station Building.

It has been assumed that all elevators will operate in a "flow through" configuration (where possible) featuring front and rear entrances, have two stops and be machine-room-less traction type passenger elevators

Outline Description of Elevator Systems

(as per Metrolinx Outline Specification (April 30, 2012)

- Provide machine-room-less traction type passenger elevators.
- Elevators shall have rated capacity of 1814 kg (4000 lb), minimum rated speed of 1.00 mps (200 fpm) and be equipped with 1220 mm (48") horizontal, two speed, side opening doors.
- Provide entrances at each floor served, with 1220 mm (48") wide x 2135 (7'-0") high clear opening and finished in glass with stainless steel framing.
- Provide cab configuration to accommodate front openings at Levels 1 and rear openings at Level 2.
- Car enclosure shall have nominal clear inside dimensions of 1725 mm (5'-8") wide, 2285 mm (7'-6") deep and a minimum overall height of 2440 mm (8'-0")
- Provide car enclosure with stainless steel fronts, one (1) car operating panel located in side wall in centre of car and durable finishes appropriate to the building.
- Car enclosure non-access walls shall have glass and stainless steel framing, designed to maximize sight lines.
- KONE MonoSpace elevator, 1814 kg (4000 lbs)
- Hoistway Width 3,175 mm (10'-5"); Hoistway Depth: 2,375 mm (7'-91/2")
- 1.00mps (200 fpm)
- Pit Depth 1,727 mm (5'8")
- Clear Overhead 4,140 mm (13'-7")

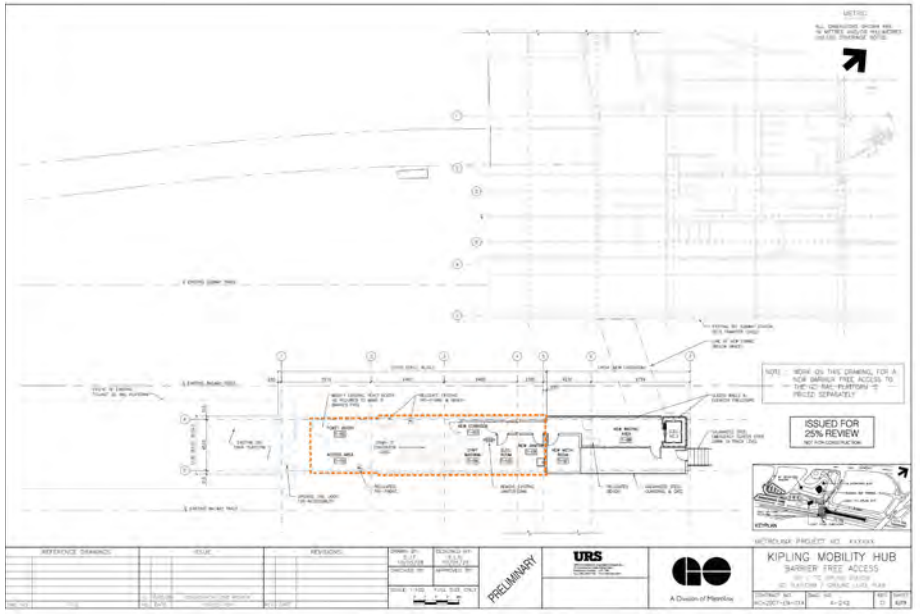
6.0 GO STATION IMPROVEMENTS

6.1 INTRODUCTION

Accessibility upgrades to the existing Kipling GO station form a discrete, but integral, part of the Kipling Bus Terminal Feasibility Study. The Kipling GO Station is not currently accessible, and the Kipling Bus Terminal Feasibility Study presents an opportunity to bring the station into conformance with the latest Accessibility for Ontarians with Disabilities Act (AODA) standards. Architectural drawings A-230 and A-231, found in Appendix B, describe this scope of work.

The existing Kipling Station GO rail platform is a central type platform, located between track no. 1 (north) and track no. 2 (south) of the multi-track CP rail corridor. Access to the platform is by a stair located within the existing GO Station Building at the east end of the platform. The base of the stair connects to the existing north-south pedestrian tunnel, providing access to the TTC ticket concourse to the north, or the South Parking lot to the south.

The earlier 25% design report for the Kipling Mobility Hub, by URS, included plans for accessibility upgrades to this structure. The plans (illustrated, to the right) proposed extending the existing building eastward. This plan would interfere with an existing CP signal shed located in the area. Preliminary consultations with CP Rail suggested that relocating this signal box was challenging and that the Kipling Bus Terminal Feasibility Study should develop an alternate plan.



Proposed GO Station Building extension from previous 25% Report (2010)

6.2 CONSTRAINTS

Work on the existing GO Station building is limited by a number of constraints on both the design and construction. These include:

Design Constraints:

- Existing CP signal shed immediately to the east
- Hydro One restrictions on construction underneath their infrastructure.
- TTC standards, specifications and approval for any changes to infrastructure owned by the TTC (north-south pedestrian tunnel, specifically).
- CP Rail standards and specifications related to track infrastructure.
- Protection for future long-term GO Transit plans for the Milton line.

Construction Constraints (as per 25% design report for Kipling Mobility Hub - to be confirmed through continuing discussions with CP Rail):

- Shut downs must be arranged well in advance with CP Rail.
- Only track No. 1 may be shut down for more than a few hours (e.g. for installation of a new underpass or excavation for below-grade structures).
- Track No. 2 may be closed for a maximum of 5 hours, between the last Toronto bound GO train in the morning and the first Milton bound GO train in the afternoon (e.g. for driving piles, installing tie-backs or for conducting geo-technical survey work adjacent to track No. 2 track).
- For general construction work on the rail level, not requiring an absolute shut down (e.g. delivery of construction materials across live tracks) the contractor must work under the protection of a flagman between trains, standing aside when train movements occur.
- Requirement that a CP flagman be present whenever work is done at the rail level or equipment is used on the GO platform.
- Site access will be across the south tracks, requiring a temporary rail crossing.
- Design of shoring and temporary structures are subject to CP approval. CP recommends that the Structural Engineer, not the contractor, prepare and submit these well in advance of the construction period.
- The minimum clearance to live CP rail tracks is 8’ - 4 ¼” measured horizontally from the centerline of the tracks and 23’ - 0” measured vertically from the top of the rails. No temporary encroachment for construction (e.g. for hoarding or storage) is permitted.
- Temporary power, communications and other wire crossings over live CP rail tracks must be at least 25 feet above the top of rail.
- Contractor must adhere to CP Rail standards when working or preparing to work in the right of way. This includes safety training of site personnel, meetings with and submissions to CP in advance of doing work, etc.
- Existing fire-optics cables in the CP right-of-way need to be located if the design proceeds to the next stage. Companies with fibre-optic cables include Level3 and Rogers. Hand excavation is required when doing work in proximity to these cables.
- Partial disruptions to TTC operations are limited to their off-peak hours (weekends and 9:30 a.m. to 3:00 p.m. and 7:00 p.m. to 6:00 a.m. weekdays).
- Significant disruptions to TTC operations are limited to their non-operating hours (2:35 a.m. to 5:00 a.m. Monday to Saturday and 2:00 a.m. to 7:50 a.m. Sundays).
- Disruptions to existing GO facilities (building, platform and services) is limited to their non-operating hours (weekends and 9:30 a.m. to 3:00 p.m. and 7:00 p.m. to 6:00 a.m. on weekdays).

6.3 INVESTIGATIONS AND SITE VISITS

The Kipling Bus Terminal Feasibility Study relied on information included in the 25% Preliminary Design Report for Kipling Mobility Hub by URS, dated May 28, 2010. This includes drawings for GO Transit Contract No 80-PT-26, marked: “Not an “As Built” dwg. set”. It is understood that drawings for later revisions to the ticket booth are not available. Survey information for this area was also not available, and will need to be augmented as part of detailed design work.

The design for the renovation and expansion of the existing GO Station Building was developed as part of an iterative design process that incorporated stakeholder input at key points. Options for the Building were presented and reviewed at the following meetings:

- TAC Meeting #2 - February 7th, 2013
- GO Station Building Meeting - May 16th 2014
- GO Station Building Meeting - August 11th, 2014
- GO Station Building Meeting - September 17th, 2014
- GO Station Building Meeting - September 4th, 2014

6.4 DESIGN STANDARDS

The basis for the design for the GO Station Building includes:

- Kipling Mobility Hub - Design Concept Development Study, Final Report, by planning Alliance / McCormick Rankin, July 20, 2009
- 25% Preliminary Design Report for Kipling Mobility Hub by URS, May 28, 2010
- Ontario Building Code 2012
- Record Drawings of Kipling Station provided by Metrolinx
- “GO Transit Standard Specification for Mini-Platforms” (May 1, 2006)
- TTC Design Manuals and Standard and Directive Drawings
- GO Transit Design Requirements Manual
- Metrolinx Mobility Hub Guidelines
- Crime Prevention Through Environmental Design Principles
- National Fire Protection Association (NFPA) 130: Standard for Fixed Guideway Transit and Passenger Systems
- Ministry of Transportation regulations

6.5 PREFERRED DESIGN

The preferred design for making the existing GO Station Building fully accessible includes widening the existing north-south pedestrian tunnel to house a new ticket booth, a pair of public washrooms, a staff washroom and a janitor's closet. A new elevator would be installed at the west end of the building with stops at the existing concourse level, existing pedestrian tunnel level and at the GO platform level. The existing stair would be replaced by a new stair that extends down to the existing concourse level. The new stair would be located along the north wall of the existing building, allowing space for an access corridor that connects to the new elevator. The platform level would include a waiting area, relocated pay-phone and mechanical/electrical room.

This solution was selected because it:

- Does not require relocation of the CP signal shed;
- Is contained within the envelope of the existing building (as per Hydro One restrictions) with the exception of part of the elevator shaft over-run, that extends above the existing room by approximately 1m;
- Provides an accessible connection between the existing concourse level and the existing pedestrian tunnel level (an elevator at the south parking lot entrance would still be required to make that entrance fully accessible); and
- Provides new accessible public washrooms.

Widening the existing pedestrian tunnel will require changes to the existing TTC concourse level, including:

- Relocation of the existing pay-phones;
- Creating a new opening in the south (foundation) wall;
- Underpinning parts of the west side of the existing pedestrian tunnel wall; and
- Making good the existing finishes affected by the work.

An island type mini-platform will be constructed on the rail platform. A snow-melt system will also be installed to the full length of the GO platform, requiring the removal and replacement of all existing platform shelters and light standards.

7.0 MUNICIPAL AND OTHER APPROVALS

7.1 Municipal Road Closure Process

Construction of the new bus terminal and associated facilities is proposed for lands that include a significant part of the existing Subway Crescent right-of-way. The Study proposes terminating Subway Crescent with a new cul-de-sac at the approximate location of the 101 Subway Crescent access driveway, and the entry to the new bus terminal. The cul-de-sac would be constructed to City of Toronto Standards.

Discussions with City of Toronto Transportation staff indicate that closure of Subway Crescent will require a Municipal Road Closure Process. The process would be completed by the City of Toronto. Timing of the process is critical to the creation of new land parcel(s) on which the bus terminal will be located. Road closures are exempt from EA requirements, but the municipal road closure process can still take approximately nine months to complete. More detailed, accurate drawings showing property boundaries and closure section of the road are needed in order for the process to proceed.

7.2 CONSERVATION AUTHORITY PERMIT

The Study Area and proposed work is outside any of the Toronto Regional Conservation Authority (TRCA) regulated areas. A TRCA permit will not be required.

7.3 ZONING

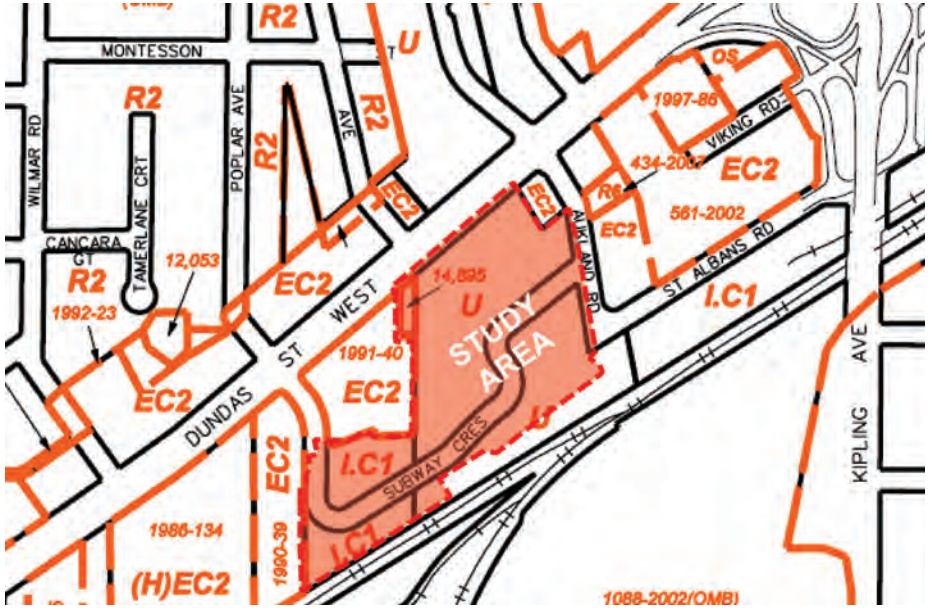
The City of Toronto Zoning By-law (By-law no. 569-2013) identifies the proposed site(s) as subject to the Former General Etobicoke Zoning Code v131.

The proposed site for the new bus terminal spans three distinct zones identified in Etobicoke Zoning Code:

- Subway Crescent right-of-way (to be closed as part of the Municipal Road Closure Process identified in section 7.1);
- Industrial Class 1 (I.C1) Zone - for the two parcels to the north and south of the existing west commuter parking lot; and
- Utilities Zone - for the eastern segment of the proposed bus terminal platform.

The proposed use is permitted within the applicable zones.

Given the complexity of property ownerships, multiple zoning codes, closing of the Subway Crescent right-of-way, planningAlliance recommends that a Preliminary Project Review (PPR) application be made to the City of Toronto in order to confirm interpretations of applicable zoning regulations.



Excerpt from the Former General Etobicoke Zoning Code - Zoning Maps

7.4 SITE PLAN APPROVAL

Should Metrolinx choose to submit the project to the City of Toronto's Site Plan Approval (SPA) process, the next phase of detailed design will need to include preparation of the necessary submission requirements. These are summarized in the City of Toronto's Development Guide (available on-line at: https://www1.toronto.ca/static_files/CityPlanning/PDF/guide_sectionD.pdf) and would likely include the following for the Kipling Bus Terminal:

- Completed Application Form;
- Boundary Survey;
- Appropriate Plans and Drawings;
- Topographical Survey;
- Building Mass Model;
- Arborist Report;
- Green Development Standards Checklist;
- Accessibility Standards Checklist;
- Noise Impact Study;
- Vlbration Impact Study;
- Geotechnical Study;
- Servicing and Stormwater Management Reports;
- Transportation Impact Study; and
- Traffic Operations Assessment.
- Wayfinding Package

7.5 OTHER APPROVALS

The following approvals will also be required in the near future, as the project proceeds to the next phase:

- Detailed review and approval of proposed design by Hydro One.
- Detailed review and approval of proposed design by CP Rail.
- Detailed review and approval by TTC
- Detail review and approval by MiWay
- Operations agreement between Metrolinx, GO Transit, Miway and the TTC.
- Confirmation of land ownership, transfer and revisions to any easements required for the new bus terminal and land negotiations and transfer agreements with the City/TTC.
- Permit to Take Water (preliminary geo-technical investigations completed for the 25% Detailed Design Report at the previous bus terminal location suggested that there may be water table issues on the site. Updated geo-technical reports for the new bus terminal locations will be necessary to verify if the same conditions apply and if dewatering or additional hydro-geological investigations will be necessary based on the anticipated depth of excavation).
- Building Permit - to be determined in continuing discussion with the City of Toronto.
- Certificate of Authorization for noise, air and water from Ministy of Environment.

8.0 IMPLEMENTATION AND PHASING

8.1 STAGING AND PHASING

Phase 1

1. Partially close Subway Cres. into east and west;
2. Maintain existing PPUDO access off of Aukland Rd.
3. Create temporary PPUDO lot at west leg of Subway Cres.

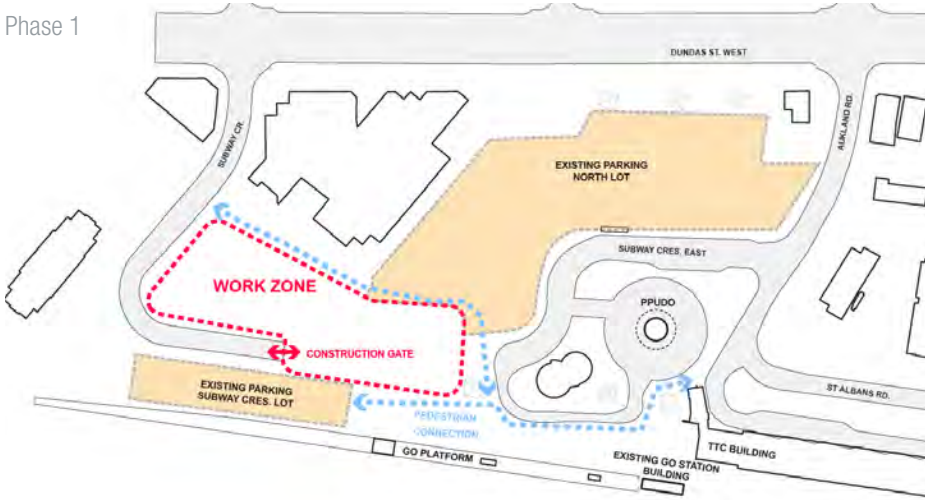
Phase 1 is concentrated at the centre of the site, along Subway Crescent, which will be split into two sections. The west section will terminate in a construction gate for the Phase 1 Work Zone. The eastern section of Subway Cres. will maintain access to the existing PPUDO building from Aukland Road as well as the existing North Parking lot.

Phase 2

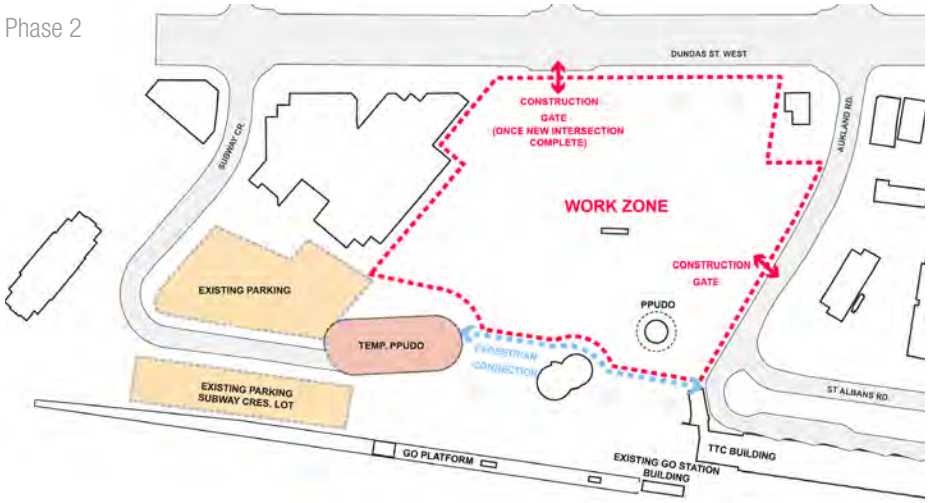
1. Open temporary PPUDO;
2. Construct new Acorn Ave. intersection;
3. Secure work zone under HONI wires;
4. Maintain pedestrian connection to TTC entrance;
5. Modify existing parking and PPUDO building.

Phase 2 is focused on the area underneath the HONI transmission lines and the North Parking Lot. In order to limit impact on the North Parking Lot, construction of the new Acorn Ave. intersection will occur at the outset of Phase 2. With the intersection complete, the North Parking Lot will be closed and secured as a work zone. Access to the temporary PPUDO zone and the existing West parking lots will be maintained from Subway Cres. West for both vehicular and pedestrian traffic. Access to the Work Zone will be provided from Aukland Rd. at the outset. “No Stopping” regulations will be enforced during this phase. Once access to the new Acorn Ave. intersection is regraded, an additional construction gate will be provided along Dundas St. West. The future parking lot and PPUDO will be built during this stage, along with accessibility upgrades to the existing PPUDO building and utility relocations.

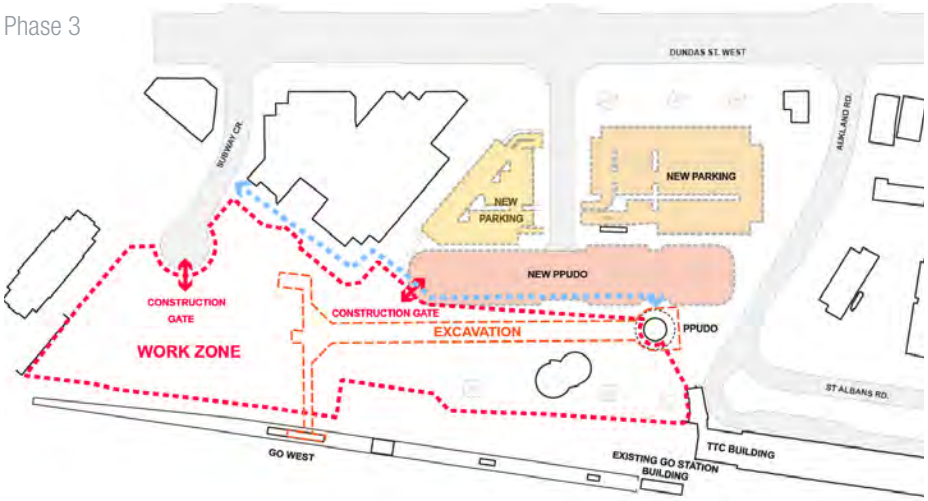
Phase 1



Phase 2



Phase 3

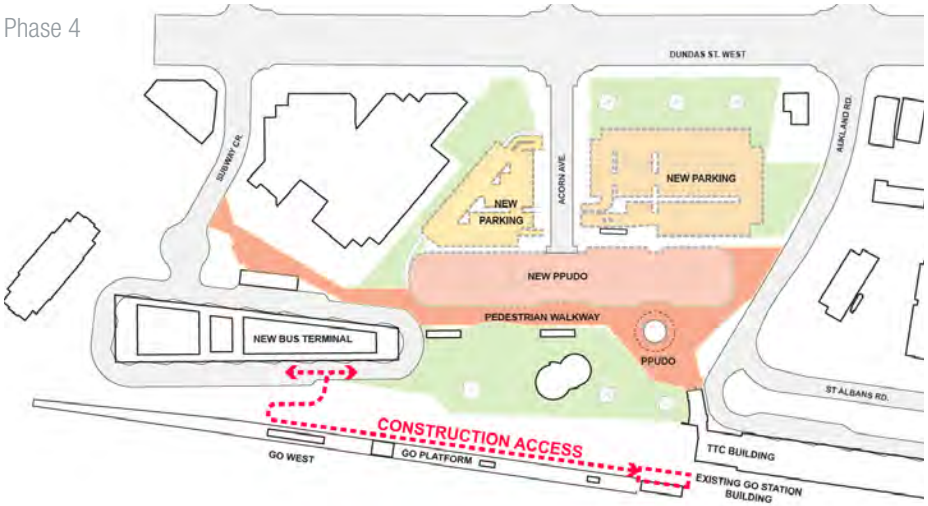


Phase 3

1. Open new PPUDO, Acorn Ave. extension and Parking;
2. Close temporary PPUDO and hoard off work zone then build Subway Cres. cul-de-sac;
3. Construct new Bus Terminal building and tunnel;
4. Construct new GO West Platform Building and tunnel;
5. Install snow melt and rebuild GO platform.

Phase 3 will focus on the construction of the new Bus Terminal building and tunnel. The new Acorn Avenue extension, PPUDO and parking lots will be opened at this stage, while the temporary PPUDO zone will be closed. Access to 101 Subway Cres. will be maintained at all times via a new cul-de-sac. The new GO West Platform Building and tunnel will also be constructed at this stage, along with a new GO platform snow melt system.

Phase 4



Phase 4

1. Open new Bus Terminal building;
2. Complete landscaping and pedestrian walkway;
3. Shore perimeter of new GO East concourse and install trestle for track;
4. Excavate below trestle;
5. Complete interior construction and elevators.

Phase 4 includes the completion of the new Bus Terminal building which will begin partial operation. GO ticket sales will be accommodated at the new Terminal Building. Construction access through the terminal will be limited to off peak hours and will require track closure. Site landscaping, including the east west pedestrian walkway, will be completed at this stage. The perimeter of the expanded concourse level of the existing GO Station building will be shored off for construction and a trestle will be installed to support the tracks above. Excavation below the trestle will be conducted, followed by installation of a new elevator and completion of interior renovations.

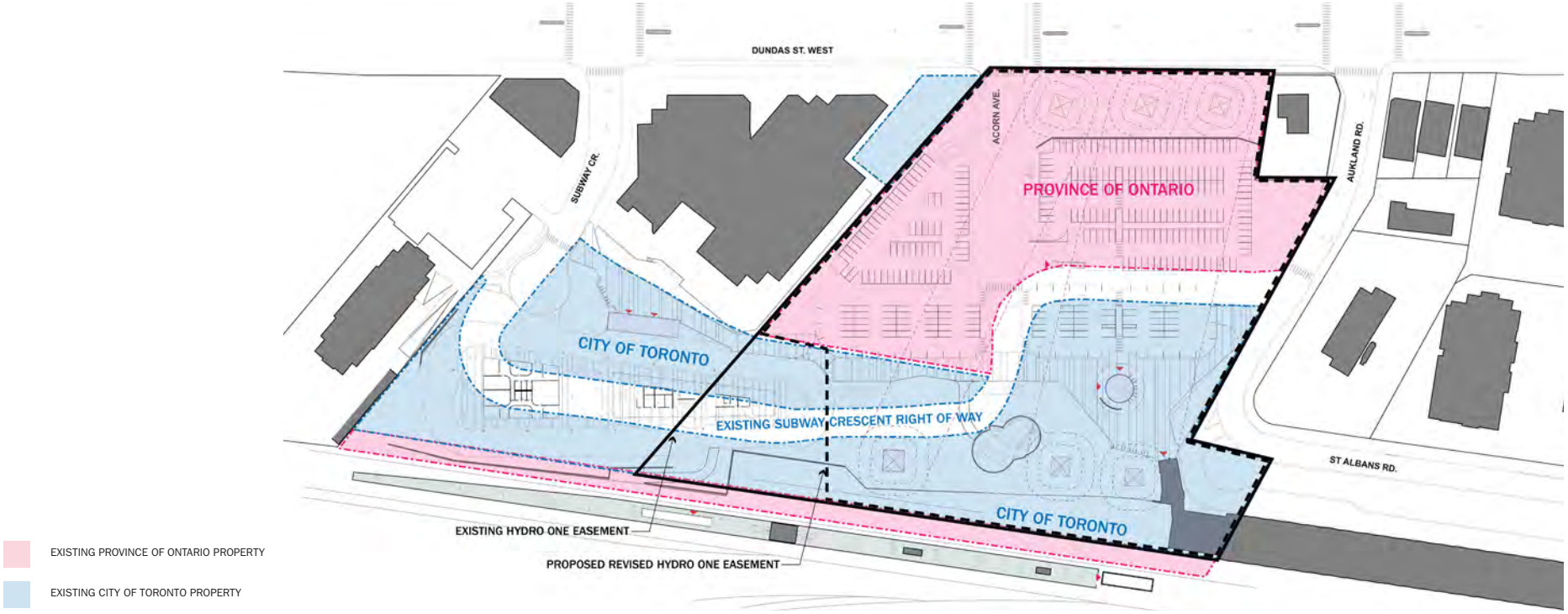
8.2 LAND REQUIREMENTS

The land proposed for the new bus terminal is currently owned by multiple owners including:

- City of Toronto - part of the Subway Crescent right-of-way
- City of Toronto - surface parking lots north and south of Subway Crescent)
- Infrastructure Ontario - surface parking lot generally underneath the overhead high-voltage distribution wires.

Additionally, the parcel owned by the City of Toronto includes a series of easements in favour of Hydro One to ensure access. These easements effectively prohibit the construction of new structures on the lands, and limit the type of landscaping permitted. As part of the Feasibility Study, Hyrdro One has a agreed to remove the easement from the western-most portion of this parcel (as shown below) to permit construction of the bus terminal.

Negotiations between the various owners to permit construction and operation of the new bus terminal, together with the registration of legal lot boundary lines and ownership will be a critical element of the next phase of work.



Land Ownership Map

8.3 NEXT STEPS

The Detailed Design phase of the project will need to address a number of issues, prepare specialist reports and confirm assumptions including:

- Preparation of additional surveys showing site topography and locations of existing structures and site features in the following areas:
    - Along the Dundas Street West frontage;
    - Along the full length of the GO Train platform;
    - In the area surrounding the existing GO Station Building; and
    - In the area of the proposed new underground ticket concourse adjacent to the existing GO Station Building.
- Preparation of additional geotechnical surveys including chemical, potential contamination, exfiltration capability, soil resistivity testing, water conditions and proposed pavement designs at areas of the proposed new bus terminal, proposed new tunnels and proposed new ticket concourse at GO Station Building, as outlined on site plan dated July 29th, 2014.
- Preparation of Stormwater Management Report including detailed stormwater management details, designs and supporting calculations.
- Preparation of Noise and Vibration (acoustic) Reports suitable for SPA submission, including ambient testing, design + prediction assessment. Note: an Acoustic Assessment Report report, dated March 14, 2007, was prepared as part of the original (pre-Mobility Hub) design work, and could potentially be updated for this purpose.
- Preparation of Subsurface Utility Engineering (SUE) to identify and locate all utilities in areas of potential conflict with the proposed works, including but not limited to: Hydro One, Toronto Hydro, Enbridge Gas, Toronto Water, Bell, CP Rail (signal cables), and Rogers.
- Preparation of designated substance reports and/or hazardous material surveys for areas not included in previous reports.
- Preparation of condition surveys of existing structures that will remain, including: the existing PPUDO facility, existing pedestrian tunnels, existing TTC Substation, existing GO Station building.
- Confirmation of all property ownership, surveys, easements and property searches that may be necessary to complete relevant agreements, MOU's and/or the Municipal Road Closure Process.
- Confirmation of ownership of the existing north-south pedestrian tunnel (assumed to be under TTC ownership).
- Confirmation of City of Toronto standards and design requirement for the modification of Subway Crescent, including cul-du-sac design, sidewalks and proposed cross walk.
- Confirmation of TTC design standards and review requirements.
- Preparation of an Arborist's Report that documents all by-law trees proposed for removal.
- Preparation of a detail Traffic Impact Study suitable for an SPA submission.

- Completion of Hydro One investigations re: footing types and condition surveys of existing hydro distribution towers.

- Preparation of updated pedestrian flow calculations, together with an assessment that includes dynamic modelling. Pedestrian flow calculations were not prepared as part of this Feasibility Study, and the earlier 25% Detailed Design (2010) relied on data provided in by the TTC in 2007, which was based on data collected in 2004.

- Confirmation of the need for an archaeological investigation and/or natural heritage assessment to satisfy the needs of the Municipal Road Closure Process).

- Confirmation of the site boundaries to be used for calculation of LEED credits.

- Completion of Toronto Green Standards (TGS) requirements into the design.

- Confirmation of commuter parking operations. The parking layouts shown in the Feasbility study have been designed to TTC standards, together with the City of Toronto's Urban Design Guidelines for Surface Parking Lots. Operational issues for the parking lot including payment form should be confirmed.

- Confirmation of requirements for replacement of commuter parking facilities in consultation with the TTC. The Feasibility Study assumed that the property east of Kipling Avenue (and south of the CP Rail corridor) would be used for commuter parking, however the net parking count remains below existing numbers. Consider exploring locations for additional commuter parking facilities.

- Section 8.2 outlines a preliminary staging and phasing plan, however the plan requires input from the TTC and GO to ensure that disruptions to operations are minimized.

- Confirmation of scope of work on City of Toronto property, including traffic signals at Acorn-Dundas and Aukland-Dundas intersections; and public boulevards along Dundas Street West, Aukland Road and Subway Crescent.

This work will likely require the retention of a number of specialist sub-consultants including:

- Ontario Land Surveyor (OLS)
- Arborist
- Archaeologist
- Life Safety Consultant
- Accessibility Consultant
- Elevator Consultant
- Hardware Consultant