

APPENDIX 1:

Winnipeg Transit - BUSwatch Signs

Functional Requirements

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Attachment

1 Schematic Map of Southwest Transitway

Overview

Winnipeg Transit has an extensive network of variable message signs installed at major on-street stops, at transit terminals, and at stations on the Southwest Transitway. These signs, branded as BUSwatch, display in LED format the current time and the route, destination, and predicted real-time departure for each upcoming bus at the stop. Data to be displayed is transmitted wirelessly to the signs from a central server at Winnipeg Transit. The data is then formatted for display by a processor within the sign housing.

The signs were installed during the 2008 – 2012 period and, at that time, the available technology restricted the type and amount of information that could be displayed. With the opening of the Southwest Transitway (Stage 2) scheduled for Spring 2020, it is the intent of Winnipeg Transit to begin an upgrade program for the BUSwatch signs. The new signs are to be higher resolution ones (HD quality or better) and capable of displaying text, graphics, maps, and video in full colour. This upgrade program, subject to available funding, is anticipated to include the following:

1. Southwest Transitway (Stage 2) – new signs at seven (7) new stations to be constructed by September 1, 2019;
2. Southwest Transitway (Stage 1) – retrofit of four (4) existing stations with new signs;
3. Southwest Transitway Terminal Stations (Balmoral Station, University of Manitoba Station); and
4. Major On-Street Stops and Transit Terminals – replace existing signs with new ones.

Note that only items 1, 2, and 3 are included in this procurement. Item 4 may be included in a separate future procurement.

A schematic map of the Southwest Transitway is shown in Attachment 1.

2.0 Existing BUSwatch Signs

2.1 Type A Signs

Type A signs have a landscape orientation and are capable of displaying 3 lines of text (see Figure 1 below). They are mounted on T-man sign structures at on-street stops and in transit terminals and are suspended from the horizontal arm as shown in Figure 2 below.

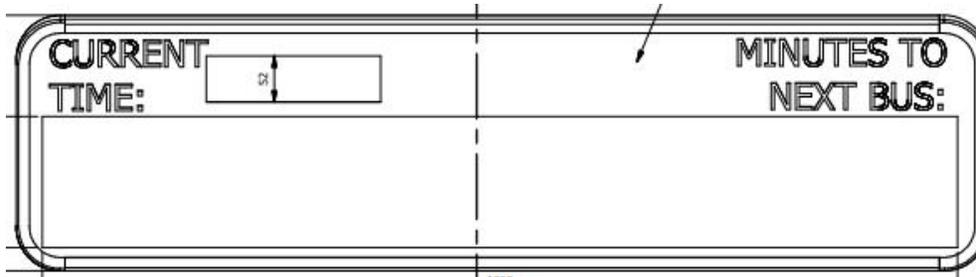


Figure 1: Type A BUSwatch sign



Figure 2: Type A BUSwatch Sign on T-Man Sign Structure

2.2 Type B Signs

Type B signs have a portrait orientation and are capable of displaying 8 lines of text (see Figure 3). They are mounted on totem sign structures at on-street stops and in transit terminals as shown in Figure 4 below.



Figure 3: Type B BUSwatch Sign



Figure 4: Type B BUSwatch Sign on Totem Sign Structure

2.3 Type C Signs

Type C signs are similar in width to Type A signs but display up to nine lines of text. Type C signs are installed at Southwest Transitway (Stage 1) stations and are suspended over the platform. In addition, two Type C signs are installed at Balmoral Station and two are mounted within the pylon sign at Osborne Station. Examples of Type C installations are in shown in Figures 5, 6, and 7 below.



Figure 5: Type C BUSwatch Sign Suspended From Platform Canopy at Fort Rouge Station



Figure 6: Type C BUSwatch Sign on Horizontal Support Arm in Osborne Station



Figure 7: Type C BUSwatch Signs Installed Within Pylon Sign at Osborne Station

2.4 Type C Signs – Canopy Attachment Mechanism at Transitway Stations

Type C BUSwatch signs are attached to the canopies of each transitway station with specialized brackets that connect to the structural canopy support beams with an integrated electrical supply as shown in Figure 8 below.

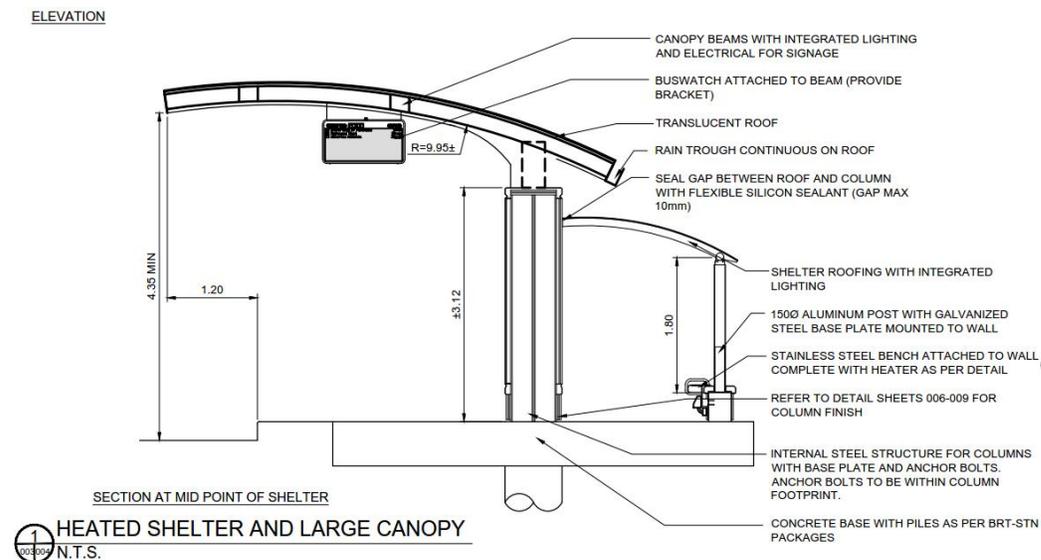


Figure 8: Type C BUSwatch Sign Canopy Attachment

2.5 Issues with Existing BUSwatch Signs

Interviews were conducted with Winnipeg Transit staff in November 2018 to determine the issues and problems experienced with the existing BUSwatch signs. Staff from the Information Systems, Service Development, and Plant and Equipment divisions provided input.

The following key issues were identified:

1. The signs have very limited display capability (mono-colour LED dots);
2. Transit has control only over the text content shown (in the prescribed format of Route Number – Destination – Departure Time); there is no control over how fast the text lines scroll or other parameters;
3. The proprietary technology results in a lack of customization as to what can be displayed;
4. It is not possible to remotely detect or diagnose problems with the signs;
5. Current signs are out of production and not able to be replaced;
6. The sign technology is a decade old and is now obsolete;
7. No replacement signs are available for installation when a sign has to be removed for repair;
8. The signs were not primed before painting which led to some issues with rust and corrosion;
9. The built-in internal antennas were not powerful enough and were supplemented with external antennas. The ends were attached by crimping instead of soldering which has resulted in a poor connection;
10. There are condensation issues at certain temperatures around 0° in the spring and fall when the electronics are warm and the air temperature is cool but humid;
11. The signs are sealed tight against weather and, in summer, cooling is difficult as the same hot air is circulated continuously within the sign housing; and
12. The existing overhead-mounted Type C signs at the transitway stations require a scissor jack to access, or a bucket truck that carries two people. Because there is only a single through lane in each direction at Harkness and Osborne stations, the signs cannot be accessed while the Transitway is in operation and are typically serviced at 05:00.

New BUSwatch Signs

At the Southwest Transitway (Stage 1 and Stage 2) stations, new signs are to be arranged as follows:

- Two screens mounted back-to-back and suspended from the canopy on each platform
- One screen mounted within each information kiosk at the station
- Two screens for each direction (southbound and northbound) mounted back-to-back within the Pylon sign at the station (i.e. a total of four screens for each Pylon sign)

At the Southwest Transitway Terminal Stations (Balmoral Station, University of Manitoba Station), new signs are to be arranged as follows:

- Two screens mounted back-to-back and suspended from existing sign structures
- One screen mounted within each information kiosk at the station

The following sections outline the number and types of signs for each Southwest Transitway station.

3.1 Southwest Transitway (Stage 2) Stations

3.1.1 Beaumont Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 9)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 10)	4	4
Pylon	On south side platform, two-sided northbound sign, and two-sided southbound sign (see Figure 10)	1	4



Figure 9: Profile View of Canopy Signs at Beaumont Station

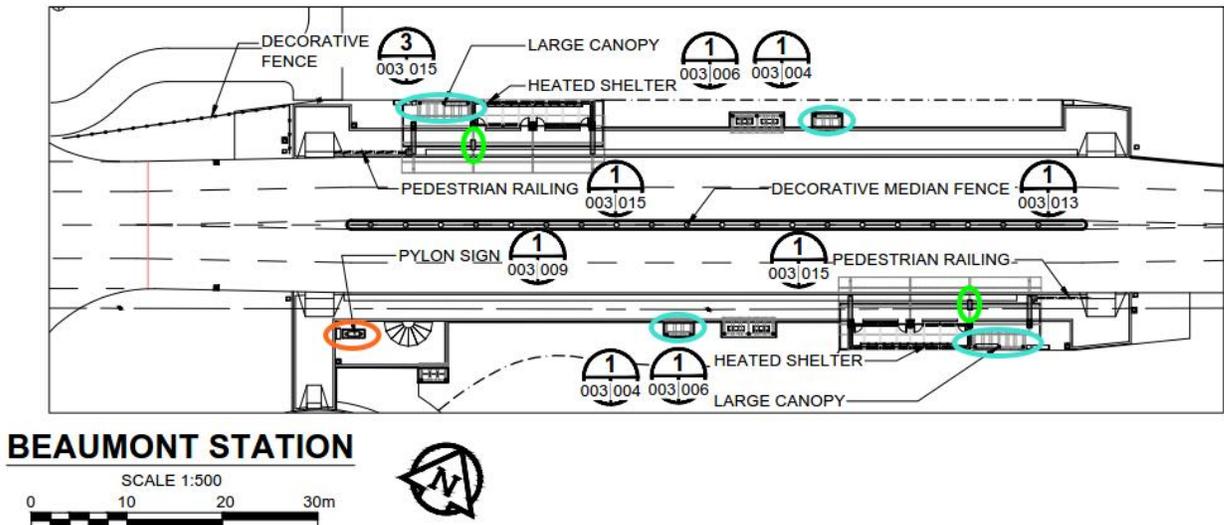


Figure 10: Plan View of Signs at Beaumont Station

3.1.2 Seel Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 11)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 12)	4	4
Pylon	On west side platform, two-sided northbound sign, and two-sided southbound sign (see Figure 12)	1	4



Figure 11: Profile View of Canopy Signs at Seel Station

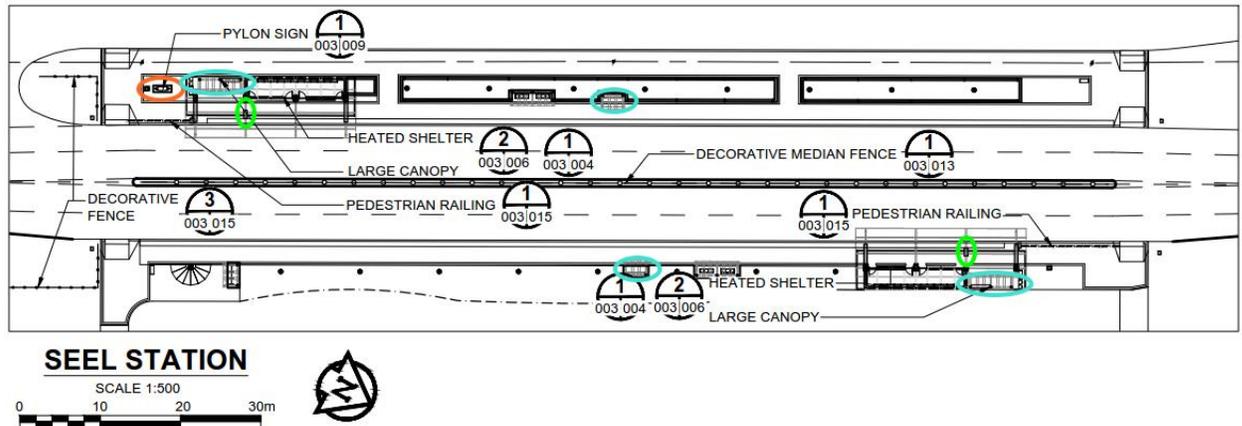
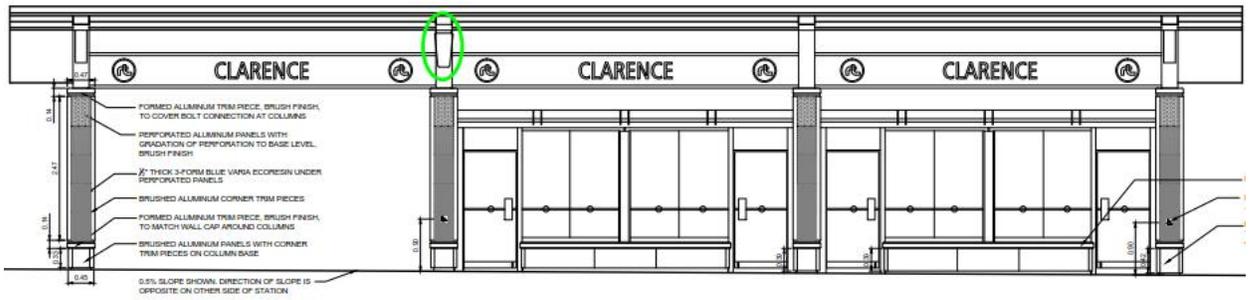


Figure 12: Plan View of Signs at Seel Station

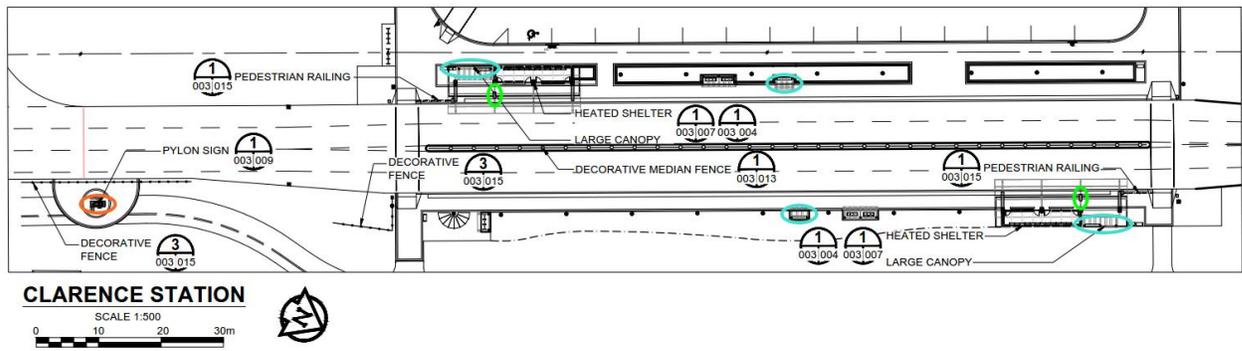
3.1.3 Clarence Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 13)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 14)	4	4
Pylon	On east side platform, two-sided northbound sign, and two-sided southbound sign (see Figure 14)	1	4



FRONT ELEVATION
CLARENCE STATION
N.T.S.

Figure 13: Profile View of Canopy Signs at Clarence Station

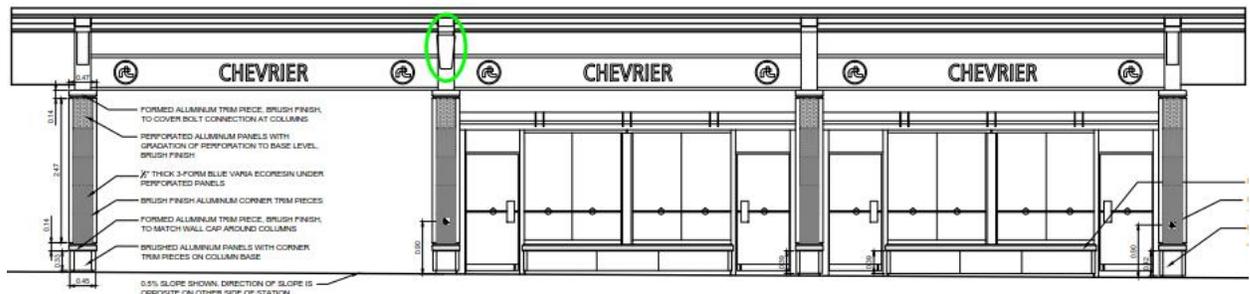


CLARENCE STATION
SCALE 1:500
0 10 20 30m

Figure 14: Plan View of Signs at Clarence Station

3.1.4 Chevrier Station

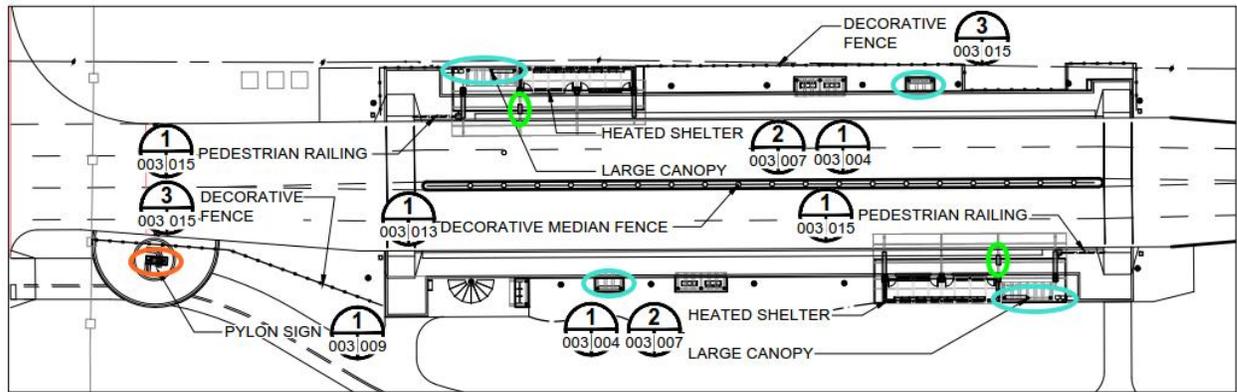
Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 15)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 16)	4	4
Pylon	On east side platform, two-sided northbound sign, and two-sided southbound sign (see Figure 16)	1	4



FRONT ELEVATION

CHEVRIER STATION
N.Y.S.

Figure 15: Profile View of Canopy Signs at Chevrier Station



CHEVRIER STATION

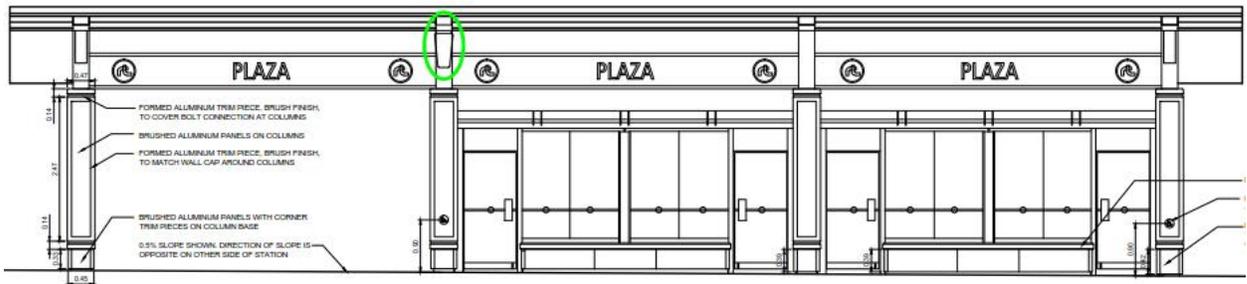
SCALE 1:500
0 10 20 30m



Figure 16: Plan View of Signs at Chevrier Station

3.1.5 Plaza Station

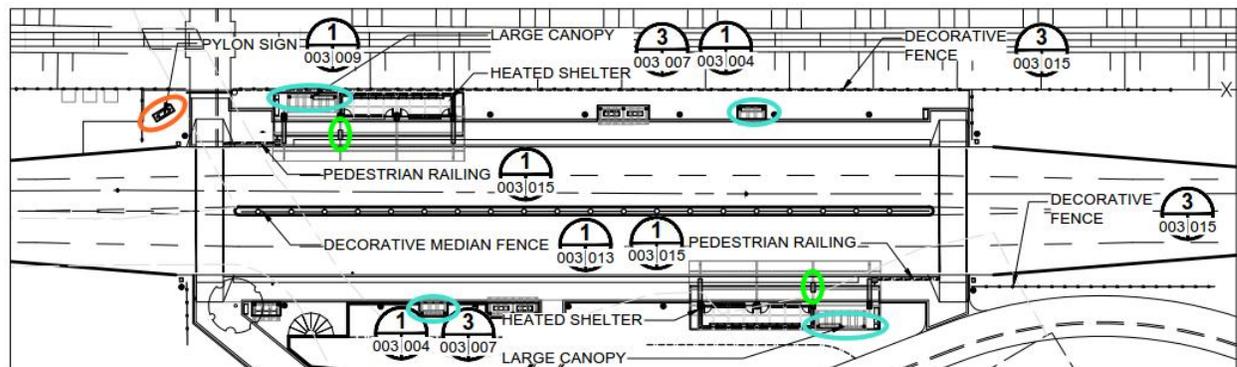
Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 17)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 18)	4	4
Pylon	On west side platform, two-sided northbound sign, and two-sided southbound sign (see Figure 18)	1	4



FRONT ELEVATION

PLAZA STATION
N.T.S.

Figure 17: Profile View of Canopy Signs at Plaza Station



PLAZA STATION

SCALE 1:500

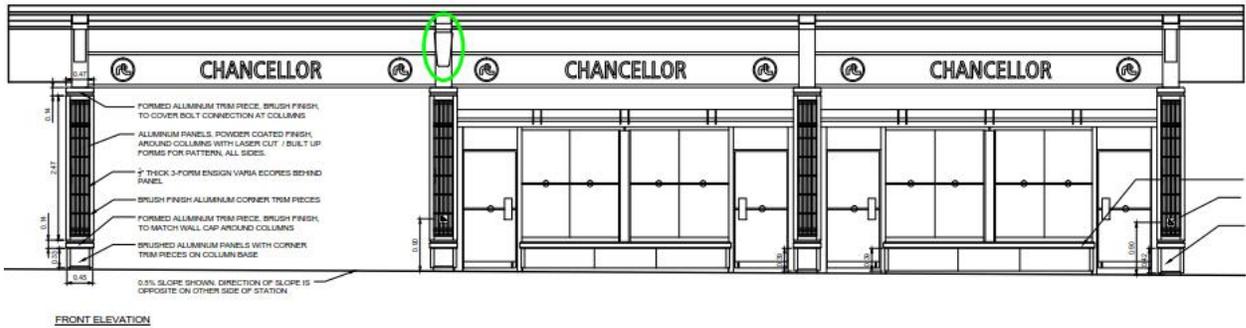
0 10 20 30m



Figure 18: Plan View of Signs at Plaza Station

3.1.6 Chancellor Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 19)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 20)	4	4
Pylon	On entrance to northbound platform, two-sided northbound sign, and two-sided southbound sign (see Figure 20)	1	4



CHANCELLOR STATION
N.T.S.
Figure 19: Location of Canopy Signs at Chancellor Station

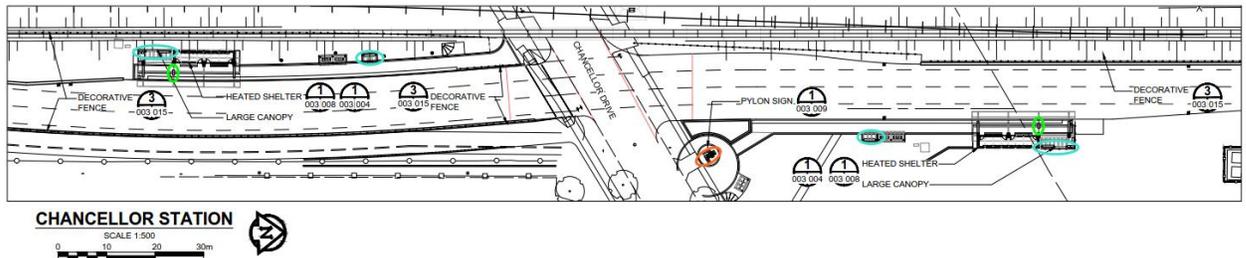


Figure 20: Location of Signs at Chancellor Station

3.1.7 Markham Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see Figure 21)	2	4
Kiosk	Within each of two kiosks on each platform (see Figure 22)	4	4
Pylon	At station entrance, two-sided northbound sign, and two-sided southbound sign (see Figure 22)	1	4



MARKHAM STATION
N.T.S.

Figure 21: Location of Canopy Signs at Markham Station

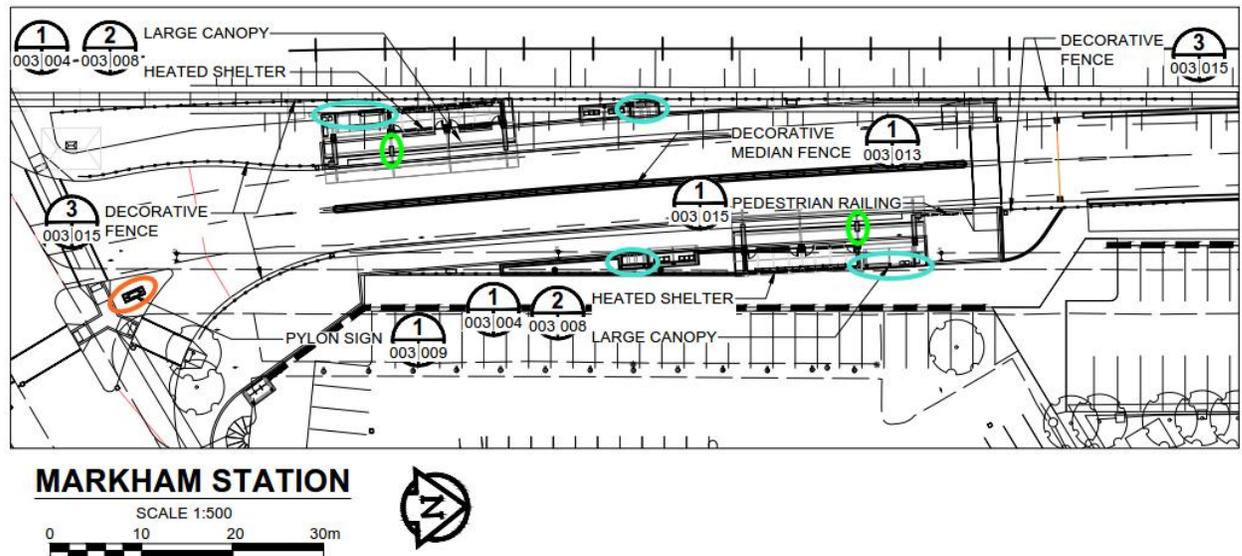


Figure 22: Location of Signs at Markham Station

3.1.8

Summary for Southwest Transitway (Stage 2) Stations

Type	# Of Installations	# Of Screens
Canopy	14	28
Kiosk	28	28
Pylon	7	28
Total	49	84

3.2 Southwest Transitway (Stage 1) Stations

3.2.1 Harkness Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see photo)	2	4
Kiosk	Within each kiosk on each platform (see photos)	2	2
Pylon	On north side platform, two-sided northbound sign, and two-sided southbound sign (see photo)	1	4



3.2.2 Osborne Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from existing mounting bar (see photo)	2	4
Kiosk	Within each of one kiosk on each platform (see photos)	2	2
Pylon	On exterior plaza, two-sided northbound sign, and two-sided southbound sign (see photos)	1	4



3.2.3 Fort Rouge Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, two-sided, suspended from canopy (see photo)	2	4
Kiosk	Within each kiosk on each platform (see photos)	2	2
Pylon	On east side of station, two-sided northbound sign, and two-sided southbound sign (see photo)	1	4



3.2.4

Jubilee Station

Type	Location	# Of Installations	# Of Screens
Canopy	On each platform, suspended from canopy (see photo)	2	4
Kiosk	Within each kiosk on each platform (see photos)	2	2
Pylon	On east side platform, two-sided northbound sign, and two-sided southbound sign (see photo)	1	4



3.2.5

Summary for Southwest Transitway (Stage 1) Stations

Type	# Of Installations	# Of Screens
Canopy	8	16
Kiosk	8	8
Pylon	4	16
Total	20	40

3.3 Southwest Transitway Terminal Stations

3.3.1 Balmoral Station

Type	Location	# Of Installations	# Of Screens
Sign Structure Mounted	On platform beneath parkade, two-sided, suspended from two existing sign structures (see photos)	2	4



3.3.2 University of Manitoba Station

Type	Location	# Of Installations	# Of Screens
Sign Structure Mounted	On platform, suspended from each of four existing sign structures, two-sided (see Figures 23 and 24)	4	8
Kiosk	Within each of two kiosks on the station platform (see Figures 23 and 24)	2	2

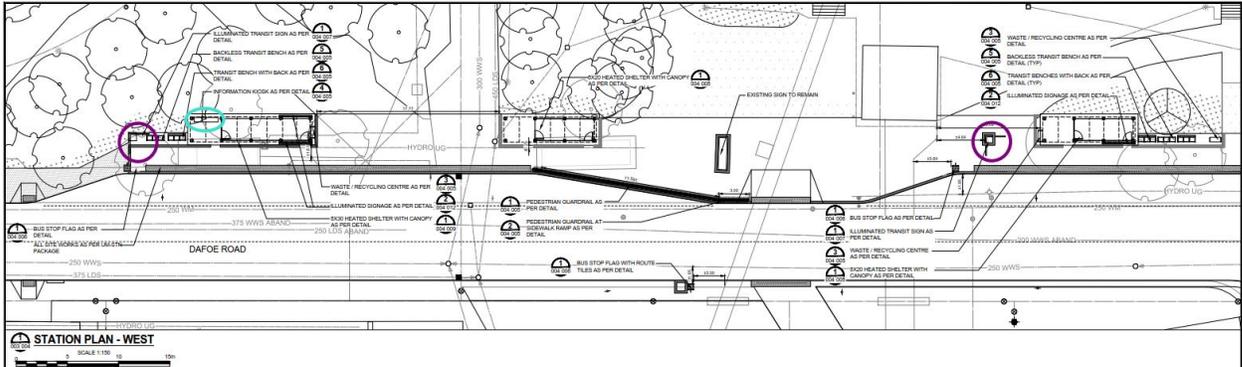


Figure 23: Location of Signs at University of Manitoba Station (West Part)

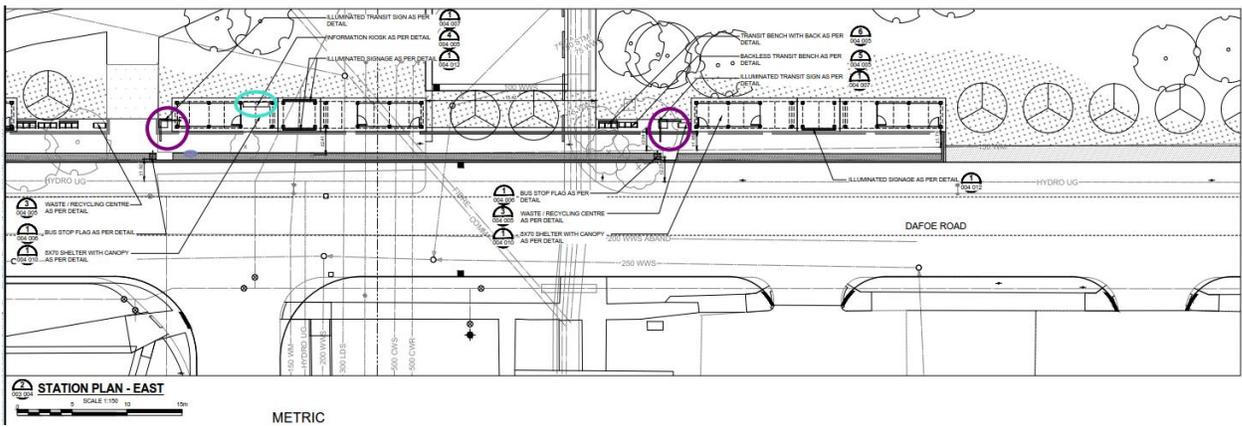


Figure 24: Location of Signs at University of Manitoba Station (East Part)



3.3.3

Summary for Southwest Transitway Terminal Stations

Type	# Of Installations	# Of Screens
Canopy	-	-
Kiosk	2	2
Pylon	-	-
Sign Structure Mounted	6	12
Total	8	14

4.0 Functional Requirements of BUSwatch Signs

4.1 Scope of Work

- 4.1.1 The work to be completed includes the supply, installation, and testing of new BUSwatch signs that meet the functional requirements described below (including, but not limited to, screens, housings, mounting/attachment hardware, controllers, operating systems, electrical/communications connections, training, operations/maintenance manuals) as follows:
- a) PART A: Southwest Transitway (Stage 2) Stations (as per Section 3.1)
 - b) PART B: Southwest Transitway (Stage 1) Stations (as per Section 3.2)
 - c) PART C: Southwest Transitway Terminal Stations (as per Section 3.3)
- 4.1.2 The work shall be assigned in accordance with available funding and prioritized in the following packages:
- Priority 1: PART A – Canopy, Kiosk, and Pylon installations at Beaumont, Seel, Clarence, Chevrier, Plaza, Chancellor, and Markham stations; and
- PART B – Canopy, Kiosk, and Pylon installations at Osborne Station.
- Priority 2: PART B – Canopy installations at Harkness, Fort Rouge, and Jubilee stations.
- Priority 3: PART B – Kiosk and Pylon installations at Harkness, Fort Rouge, and Jubilee stations.
- Priority 4: PART C – Sign Structure installations at Balmoral Station, and Sign Structure and Kiosk installations at University of Manitoba Station.

4.2 Critical Dates

- 4.2.1 Substantial Performance and Total Performance shall be achieved by February 14, 2020.

4.3 Coordination of Work

- 4.3.1 For the Priority 1 work package, the Contractor shall be required to coordinate its work with Winnipeg Transit and with *Project Co* for the City's Southwest Rapid Transitway (Stage 2) and Pembina Highway Underpass Project (contract 201-2014B) for work at the Southwest Transitway (Stage 2) stations, and with Winnipeg Transit for work at Osborne Station.
- 4.3.2 For the Priority 2 and Priority 3 work packages, the Contractor shall be required to coordinate its work with Winnipeg Transit.
- 4.3.3 For the Priority 4 work package, the Contractor shall be required to coordinate its work with Winnipeg Transit for work at Balmoral Station, and with Winnipeg Transit and with *Project Co* for the City's

Southwest Rapid Transitway (Stage 2) and Pembina Highway Underpass Project (contract 201-2014B) for work at University of Manitoba Station.

- 4.3.4 For work at stations in the Priority 1 work package and at University of Manitoba Station in the Priority 4 work package, the Contractor shall be required to comply with the site safety requirements of *Project Co* in effect for the construction of the City's Southwest Rapid Transitway (Stage 2) and Pembina Highway Underpass Project (contract 201-2014B), and to obtain CN Safety Certification for each person working on sites in close proximity to CN rights-of-way. Safety certification for each of *Project Co* and CN involves an in-class or online tutorial and subsequent test (approximate 2 to 3 hour time commitment for each). There is a nominal fee for safety certification for each of *Project Co* and CN.

4.4 Display Capabilities

- 4.4.1 The BUSwatch signs shall be ruggedized flat screen colour displays rated for outdoor performance in a full range of Winnipeg weather conditions (-40° C to +40° C), and shall be capable of displaying text, graphics, maps, and video.

4.5 Legibility and Sign Dimensions

- 4.5.1 The signs shall provide HD resolution or better; shall have a screen size that is sufficiently large to ensure legibility when viewed by passengers waiting on the platform; and shall be non-glare and easy to read in all kinds of light conditions.
- 4.5.2 The BUSwatch signs shall comply with the *2015 City of Winnipeg Accessibility Design Standard, Third Edition* (PDF can be accessed at https://winnipeg.ca/ppd/Universal_Design.stm), with specific reference to Section 1.2.4 Signage, Section 1.2.5 Information Systems, and Section 2.3.4 Transit Facilities.
- 4.5.3 The specific dimensions of the signs shall depend on the installation location (canopy, information kiosk, Pylon, sign structure), but screens mounted on canopies and pylons shall have a minimum diagonal dimension of at least 1,270 mm (50 in). Bidders shall investigate station sites to determine the appropriate dimensions of signs so that the signs comply with the legibility requirements and that the signs fit on or within the installation locations.
- 4.5.4 During the procurement period, bidders shall perform a Demonstration Mock-Up for each type of their recommended signs to Winnipeg Transit staff at a location to be determined by Winnipeg Transit. The Demonstration Mock-Up for each type of sign shall be in an outdoor location and shall include a screen (with functional electrical, network communications, and software connections) positioned at an elevation consistent with the intended installation location of each type of sign. Note that these Demonstration Mock-Ups will not require the signs to be permanently installed.

4.6 Data, Communications, Software, and Power Requirements

- 4.6.1 The BUSwatch signs shall provide wireless communications through LTE modems, with wired Ethernet connections between the LTE modems and the signs.
- 4.6.2 The sign processor shall use a Linux operating system to facilitate application development, application support, troubleshooting, and software updates by Winnipeg Transit's Information Systems staff.
- 4.6.3 The processor and communications architecture shall provide virtual remote access to the signs from a Winnipeg Transit server for purposes of application development, application support, troubleshooting, and software updates.
- 4.6.4 The configuration of LTE modems, Ethernet connections, processors, display drivers and any other required equipment at each station shall minimize, as practically as possible, the number of system devices required to operate the BUSwatch signs at the station.
- 4.6.5 The Contractor shall assist Winnipeg Transit staff during the initial setup of the system components, software and communications systems.
- 4.6.6 The signs require standard hard-wired 110V AC electrical service. They shall have sufficient battery capacity to permit power cycling while leaving the sign in place. If a sign requires rebooting, power cycling shall be provided both remotely from Winnipeg Transit offices and on-site at the electrical supply cabinet at ground level.
- 4.6.7 An electrical supply is provided to each station at a central supply cabinet. Electrical conduits exist between the central supply cabinet and each of the locations within the station at which BUSwatch signs are to be installed. The Contractor shall be responsible for the installation of all electrical cables, as required, at each station. Electrical conduit drawings can be provided to the Contractor.
- 4.6.8 Should the existing electrical supply not have sufficient capacity for the signs and their heating/cooling equipment, the Contractor shall be responsible for any required electrical upgrades.
- 4.6.9 The Contractor shall be responsible for the installation of any necessary communications conduits and cables between the LTE modems and the signs in accordance with the National Building Code of Canada.
- 4.6.10 Any installation of conduits by the Contractor shall be confirmed in the field to ensure that no existing infrastructure above ground or below ground is negatively affected, including but not limited to canopies, station amenities, landscaping, piles, roadway structures, and utilities.
- 4.6.11 Installations of new conduits that cross beneath the Southwest Transitway shall be installed a minimum of 10 metres beyond the longitudinal limits of the station platforms.
- 4.6.12 Conduits, electrical, communications, and other materials shall be installed according to the National Building Code of Canada. The Contractor shall ensure that the design and construction is completed to the most current available codes.

4.7 Housings, Mounting/Attachment Mechanisms, and Securement

- 4.7.1 Each sign shall have a secure stainless steel or cast aluminum housing that protects the sign and any of its dedicated components (e.g. processor, modem, etc.) from weather and vandalism; that provides appropriate heating, cooling, and ventilation; that includes secure mounting/attachment mechanisms; and that is compatible with station aesthetics.
- 4.7.2 Any system components (e.g. processor, modem, etc.) that are not housed with a specific sign shall have a secure stainless steel or cast aluminum housing that protects them from weather and vandalism; that provides appropriate heating, cooling, and ventilation; that includes secure mounting/attachment mechanisms; and that is compatible with station aesthetics.
- 4.7.3 Metals used in housings shall be compatible with the metals used in the station components at each of the attachment locations for the signs. If metals of dissimilar materials are used, the Contractor shall utilize the appropriate hardware and/or rubber or plastic spacers required to ensure that rusting does not occur on the housing components/hardware, or on the station elements at the attachment locations.
- 4.7.4 All signs and housings shall meet standards for wind and snow loading.
- 4.7.5 For the Priority 1 work package, the mounting/attachment mechanisms for signs attached to station canopies shall be compatible with the canopy infrastructure.
- 4.7.6 For the Priority 2 and Priority 3 work packages, the mounting/attachment mechanisms for signs attached to station canopies shall be compatible with the existing mounts and canopy infrastructure.
- 4.7.7 For the Priority 4 work package, the mounting/attachment mechanisms for signs shall be compatible with the existing sign structures.
- 4.7.8 The installations for all signs, system components, and housings shall be of vandal resistant and graffiti resistant construction and shall be sufficiently secure to minimize risks of theft.
- 4.7.9 A keyed handle lock shall be used to secure signs within housings.
- 4.7.10 Housings shall be CSA approved; all components shall be assembled in a CSA approved facility; and the entire sign assemblies shall be CSA approved.

4.8 Maintenance Requirements

- 4.8.1 The screens, connections, and controllers of the BUSwatch signs are to minimize the use of proprietary hardware. If proprietary hardware is necessary for any of the screens, connections, and controllers, the Contractor shall provide such designs, drawings, licenses and other information to Winnipeg Transit to facilitate maintenance of the components by Winnipeg Transit staff following the Warranty period.
- 4.8.2 For a minimum duration of ten (10) years subsequent to the date of Total Performance, replacement signs and spare parts shall be available in sufficient quantity and in sufficient proximity to Winnipeg such that they can be sourced and delivered to Winnipeg Transit within four (4) business days.
- 4.8.3 The BUSwatch signs shall be capable of automatically providing real-time sign status information (e.g. in service, component failure, power loss, etc.) for remote monitoring by Winnipeg Transit so that malfunctioning signs can be repaired or replaced in a timely manner.
- 4.8.4 For maintenance purposes, the sign housing shall be sufficiently large to provide adequate space for ease of removal and installation. The front panel of the housing shall be hinged at the top and include a locking arm to keep the front panel in a raised horizontal position during sign removal or installation.
- 4.8.5 The signs shall have soldered connections and appropriate air circulation in the cabinets for cooling and for the prevention of condensation.

4.9 Shop Drawings and Factory Acceptance Test

- 4.9.1 Subsequent to award of contract and prior to installation of signs, the Contractor shall submit shop drawings to the Contract Administrator for review.
- 4.9.2 Subsequent to award of contract and prior to installation of signs, the Contractor shall perform a Factory Acceptance Test (FAT) at a Winnipeg Transit facility at a time mutually agreed between the Contractor and the Contract Administrator.

4.10 Warranty

- 4.10.1 All components and materials supplied for the BUSwatch signs shall be warranted for replacement or repair for a minimum of three years subsequent to the date of Total Performance.
- 4.10.2 For the duration of the Warranty period, the Contractor shall provide, at its cost, an inventory of the following spare signs to Winnipeg Transit:
 - a) Two (2) sets of canopy-mounted signs (i.e. each set comprised of 2 screens, controller, housing, and mounting/attachment hardware);
 - b) Two (2) sets of kiosk signs (i.e. each set comprised of 1 screen, controller, and mounting/attachment hardware); and
 - c) Two (2) sets of Pylon signs (i.e. each set comprised of 2 screens, controller, and mounting/attachment hardware),

- 4.10.3 Further to 4.10.2, the spare signs (or components) shall be used to replace installed signs (or components) that become defective during the Warranty period.
- 4.10.4 The removal of defective signs (or components) and the installation of spare signs (or components) during the Warranty period shall be undertaken by Winnipeg Transit staff. The Contractor shall reimburse Winnipeg Transit for the costs incurred by Winnipeg Transit to undertake the removals and installations during the Warranty period.
- 4.10.5 During the Warranty period, defective signs (or components) shall be returned to the Contractor for repair or replacement. Defective signs (or components) that are repaired, or replacements in lieu of defective signs (or components) that cannot be repaired, shall be supplied to Winnipeg Transit within four (4) business days of the defective signs (or components) being received by the Contractor. The costs of replacement or repair, including shipping, shall be borne by the Contractor.

4.11 Spare Signs

- 4.11.1 To facilitate office-based content testing, one screen and controller of the type used for canopy-mounted signs shall be supplied to Winnipeg Transit by the date of Total Performance.
- 4.11.2 Immediately upon expiration of the Warranty period, the following new spare signs shall be supplied to Winnipeg Transit:
- a) Two (2) sets of canopy-mounted signs (i.e. each set comprised of 2 screens, controller, housing, and mounting/attachment hardware);
 - b) Two (2) sets of kiosk signs (i.e. each set comprised of 1 screen, controller, housing, and mounting/attachment hardware); and
 - c) Two (2) sets of Pylon signs (i.e. each set comprised of 2 screens, controller, housing, and mounting/attachment hardware).

4.12 Training and Documentation

- 4.12.1 Training on the operation and maintenance of the BUSwatch signs shall be provided to Winnipeg Transit staff on the premises of Winnipeg Transit no later than the start date of the Warranty period. The training session shall be for a minimum of four (4) hours on a date mutually agreed between Winnipeg Transit and the Contractor. The Contractor shall arrange for video recording of the training content and for the supply of the video of the training content to Winnipeg Transit on DVD media.
- 4.12.2 Documentation (including network architecture schematic drawings) necessary for the operation, maintenance, and troubleshooting of the signs shall be provided to Winnipeg Transit.
- 4.12.3 Copies of operations and maintenance manuals shall be provided to Winnipeg Transit (4 printed copies, 1 PDF copy).
- 4.12.4 A detailed parts list for each type of sign shall be provided to Winnipeg Transit in PDF format.

4.13 Future Work

- 4.13.1 Further to 4.1 *Scope of Work*, Winnipeg Transit may proceed with future work to replace existing Type A and Type B signs at locations throughout the city that are not specified in 4.1 *Scope of Work* (approximately 100 locations). At these locations, the new signs will be required to be installed on the sign structures shown in Figure 2 (referred to as a “T-Man” structure) and in Figure 4 (referred to as a “Totem” structure). The Contractor shall provide written confirmation that, should Winnipeg Transit decide to proceed with this future work, the electrical, communications, and software arrangements used for the BUSwatch installations at stations on the Southwest Transitway are capable of being deployed at other bus stops throughout the city.

Attachment 1

Schematic Map of Southwest Transitway