[Guideline Performance Specifications for Prefabricated Bus and Rail Shelters]

1 DESCRIPTION

The work covered by this Section includes all labour, material, equipment and supervision necessary to complete the platform shelters as shown on the drawings and as specified herein.

2 RELATED WORK SPECIFIED ELSEWHERE

Concrete under Section 03300.

3 QUALITY ASSURANCE

3.1 Prefabricated platform shelters shall be based on barrel vaulted roof and compound peaked shelter structures as detailed on drawings and related specifications herein. Systems by manufacturers similar in function, design, performance, and construction complying with requirements of this Section may be incorporated into the Work subject to the Owner's acceptance.

(A) Structural Framing: Structural aluminum at system manufacturer's option.

(B) Do not modify intended aesthetic effects, except with Engineer's approval. If modifications are proposed, submit comprehensive explanatory data for Engineer's review.

3.2 Installer Qualification: Trained and approved by the manufacturer and having minimum five years experience in the installation of the work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type.

(i) If requested, provide letter of certification from manufacturer stating that installers are approved applicators of its products, and are familiar with proper procedures and installation requirements required by the manufacturer.

(ii) Pre-Installation Meeting: Prior to commencing work of this Section, arrange for manufacturer's technical representative to visit the site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the work of this Section. Advise the Engineer of the date and time of the

meeting.

(iii) Manufacturer's Site Inspection: Have the manufacturer's technical representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the Work is correctly installed. When requested, submit manufacturer's inspection reports and verification that the work of this Section is correctly installed.

(iv) Maintenance Seminars: Engage a factory authorized service representative to instruct Engineer's maintenance personnel regarding proper maintenance procedures.

3.3 Source Limitations: Provide like products from a single manufacturer.

(i) Welding:

(A) Steel: To CSA W59 by fabricators certified by the Canadian Welding Bureau to CSA W47.1.

(B) Aluminum: To CSA W59.2 by fabricators certified by the Canadian Welding Bureau to CSA W47.2.

3.4 Finishing: Materials, preparation and quality of work in conformance with requirements of the latest edition of the Architectural Painting Specification Manual by the Master Painters Institute, issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

3.5 Accessibility Requirements: Comply with authorities having jurisdiction and building code requirements.

3.6 Glazing: Perform work in accordance with recommendations of Glazing Association of North America (GANA). Size glass to Code requirements and verify that openings for glazing are correctly sized and within tolerance.

3.7 Design, fabricate and erect all framing, supports, glazing, accessories, etc. to meet requirements of the Ontario Building Code.
Note: Location specific loading to be determined per Manufacturer's Engineer.

3.8 Shelters are to be designed to resist the minimum following specified loads:

(A) Snow = 1.5 kPa (Uniform and Patterned Loading)
(B) Wind = 1.0 kPa (Reference Wind Pressure)

The appropriate gust factor and pressure coefficients are to be applied to the Reference Wind Pressure.

3.9 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16, CSA S136, and CSA S136.1.

3.10 Comply with CSA S157/A157.1 for strength design in aluminum work.

3.11 Water Infiltration: Watertight to the interior under design conditions in combination with movements occurring due to imposed loads.

3.12 Use a safety factor of 2.5:1 minimum for glass design.

3.13 Power and Communication Service

(i) Electrical service for the shelter heaters is fed from the Shelter Heaters panel located in Electrical Room. Distribution voltage shall be 120/208V, 3 phase, 4 wire or 120/240V, 1 phase, 3 wire system depending on the site conditions. Provide equipment in the shelter with nominal voltage complying with the supplying voltage and phase.

(A) Terminate power supply and communication wirings in power and communication junction boxes, respectively, complete with tamperproof enclosures and stainless steel removable access covers embossed or engraved “ELECTRICAL WIRING" on one access cover and “COMMUNICATION WIRING" on the other access cover for each shelter. Provide barrier between power and communication compartments.

(B) The power and communication wirings shall include but not be limited to, the following components:

(I) Power conductors for shelter heaters and controls.

(II) Power conductors for shelter lighting and lighting control.

(IV) Power conductors for shelter automatic door and operator.

(V) Power conductors for GFCI receptacles.

(VI) Communication cable for PA speaker.

(VII) Provision for emergency blue light and communication.

4 SHOP DRAWINGS

4.1 Submit shop drawings in accordance with the General Conditions, Submittals and the Shop Drawing Schedule on drawings.

4.2 Indicate materials and large scale details for profiles of components, elevations of units, anchorage details, description of related components and exposed finishes and fasteners, and all openings for distribution of power and low voltage wiring as detailed on the drawings.

4.3 Engineering Design: Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:

(A) Design work as required to resist live, dead, lateral, wind, snow, and seismic loads.
(B) Structural design.
(C) Review, stamp, and sign shop drawings.
(D) Conduct shop and on-site inspections.
(E) Prepare and submit inspection reports.

5 SAMPLES & CO-ORDINATION

5.1 If requested by Owner, submit or arrange for shop inspection of the following samples in accordance with the General Instructions.

(a) Paint colour chips on steel, aluminum and any other material used on this project.
(b) Aluminum base plate and column sleeve.
(c) Light fixtures.
(d) Pressure sensitive butyl tape.
(e) Door hold open device.
(f) Easy access bench.
(g) Polycarbonate glazing.
(h) Ventilation louver.
(I) Hinged map frame.
(j) Snow guard.
(k) Mock-up of all key components.

5.2 Coordination

(i) Coordinate installation of anchorages for work of this Section. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral

anchors, that are to be embedded in concrete. Deliver items to site in time for installation.

(ii) Coordinate installation of electrical conduits for work of this Section.

5.3 Electrical Co-ordination

(i) Electrical Requirements: Coordinate the electrical and communication requirements with the other trades assembling shelter. Do wiring in strict conformity with requirements of the Ontario Electrical Safety Code and Electrical Sections. Do all electrical work to a minimum requirement of the latest Ontario Electrical Safety Code and Canadian Electrical Safety Code. All work to be done by qualified electrical personnel. All work to be inspected and approved by ESA and local authorities having jurisdiction.

(A) Work by Electrical Sections: Supply and installation of electrical enclosures, breakers, boxes, equipment, power and control of components such as: heating, lighting, receptacles etc.

(B) Work by This Section: Wiring and connection at and from equipment, breakers, junction boxes to equipment, lighting, etc. and controls, safety devices and other items requiring power.

(ii) Employ licensed electrician to wire and interconnect all operational and safety components for the Work. Terminate wiring required for connection to control circuitry and power at NEMA 4X enclosures. Ground all control wiring. Grounding shall meet the requirements of Ontario Electrical Safety Code.

(iii) Electrical Components, Devices, and Accessories: CSA Listed and labelled.

6 MAINTENANCE DATA

6.1 Provide maintenance data for the cleaning and maintenance of the Prefabricated Platform Shelters.

6.2 If used in manufacture, for each shelter supply four one litre spray guns of approved paint to the Owner for future maintenance. Three to be shelter colour and one to be green.

7 WARRANTY

All products supplied will bear a manufacturer's warranty of two years in general and five years on door closers. This warranty shall cover material, workmanship, function and finish. Any product which fails to fulfil these requirements will be removed, exchanged and reinstalled for specified items at no cost to the Owner.

8 MANUFACTURER'S QUALIFICATIONS

8.1 The shelter manufacturer shall be a qualified manufacturer with previous experience in the manufacturing, supply and installation of prefabricated shelters.

8.2 The manufacturer's field representative shall be a qualified tradesman with a minimum of five years previous experience in the erection and maintenance of prefabricated shelters, and shall be a tradesman acceptable to the Owner.

9 MANUFACTURER'S CERTIFICATE

Submit manufacturer's certificate confirming that paint materials and finish thickness comply with specifications.

10 STRUCTURAL COMPONENTS

The shelter structural components may be constructed of extruded aluminum as per paragraph 18.1

11 PRODUCT STANDARDS

11.1 All hardware herein detailed, represents the Owner's choice/selection to adequately fulfill the necessary requirements. Therefore, no substitution or deviation will be considered unless approval has been obtained from the Owner through the Engineer, prior to supply and installation. The Owner will have the final decision on any substitution.

11.2 All materials to be of first quality workmanship, material and finish. Any product which is not acceptable will be removed from the job site and replaced at no cost to the Owner.

11.3 Hardware supplied will be inspected after installation by manufacturer's representative and a written report shall be made to the Owner. Should a

manufacturer's representative not be available, the Owner's Consultant will carry out inspection and the findings will be binding on the hardware supplier. The Owner's Hardware Consultant will be a regular Consultant (A.H.C.) member of the Door and Hardware Institute, Ontario Chapter.

12 FABRICATION

12.1 Fabricate platform shelters to sizes and configurations as scheduled on the drawings.

12.2 Fabricate components allowing for accurate rigid fit of all joints and corners. Ensure all joints and connections are flush, hairline and weatherproof.

12.3 Fabricate components allowing cut-outs for complete wiring flexibility through the structural frames. Install access panels adjacent to all wiring cut-outs at the intersection of columns and beams. Access panels shall be at the wire entry side of the cut-out and shall be sized to allow hand/finger entry into the structural member to assist in fishing wiring through the intersection. Access covers shall be rectangular with rounded corners and captive screws to match drilled/tapped holes in the shelter frame. Finish cover plates to match the shelter frame finish. Indicate location of all access panels on the shop drawings along with a detail drawing of the hole and cover plate assembly.

13 SHIPPING

13.1 Stored material must not impact daily operations.

13.2 Schedule shipping and assembly of all components so as not to encumber platform and site.

13.3 Prefabricated shelter components may <u>not</u> be stored on site and must be erected upon delivery to site.

14 PERFORMANCE FINISHES

Aluminum Finishes

(i) Prefinish exposed to view aluminum surfaces. Ensure aluminum finish is free from blemishes or scratches and uniform in colour and sheen. Pretreat aluminum and apply primer and finish coats in accordance with manufacturer's instructions.

(ii) Powder Coat Finish: Components to receive a baked on painted finish " Duranar XL" by PPG or equivalent over full multi-stage chlorine free pretreatment process. Powder coating to be applied with a minimum 12 gun automatic electrostatic spray gun. Finish shall be in exterior quality powder coating applied in accordance with AAMA 2603-02, selection to be available in standard RAL colors, thickness 2+mils, gloss +/- 5 degrees per technical data.

(iii) Clear Anodic Finish: AA-M12C22A41, as fabricated nonspecular mechanical finish, medium matte etched chemical finish, architectural class I clear anodic coating of minimum 0.018 mm thick complying with AAMA 611.

(iv) Colour Anodic Finish: AA-M12C22A42/A44, as fabricated nonspecular mechanical finish, medium matte etched chemical finish, architectural class I, integrally coloured or electrolytically deposited color coating of minimum 0.018 mm thick complying with AAMA 611. Color as selected by Metrolinx from full range of industry colours and colour densities.

(v) Baked Enamel, Two Coat: AAMA 2603, high performance fluoropolymer, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70% polyvinylidene fluoride resin by weight.

(vi) Baked Enamel, Three Coat: AAMA 2603, high performance fluoropolymer, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and fluoropolymer clear top coat, colour and top coats containing not less than 70% polyvinylidene fluoride resin by weight.

Wood Finish

(i) Wood components: Protek Paint for Wood Finishes - Walnut Stain plus a marine grade spar varnish.

15 INSTALLATION

15.1 Incorporate provision of electrical raceways as detailed and supply all fastenings, cover plates, assemblies and appurtenances required for assembly. Exposed cover plates to be pre-finished to match structural elements and be fastened with stainless steel tamperproof screws. Co-ordinate installation of conduit with Section 03300 and/or existing conduits, as appropriate.

15.2 Space structural columns to suit sidewall glazing panels as detailed on drawings.

15.3 Secure roof system to each post as per approved shop drawings.

15.4 At the bottom of glass panels, install aluminum extruded channels. Set glazing panels on neoprene setting blocks and caulk with silicone sealant. Glazing channels to be installed to allow expansion and contractions of glazing panels without leakage.

15.5 Attach vertical aluminum glazing channels to shelter columns with No. 8 stainless steel screws, wrapped in Teflon tape at a maximum spacing of 450 mm.

15.6 Furnish aluminum door and frame, manufactured with complete instructions and templates for preparation of their work to receive hardware.

15.7 Furnish manufacturer's instructions for proper installation of each hardware component. Where a pull is shown on one side of a door and a push plate on the other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

15.8 Adjust operable parts for correct function.

15.9 Should there be any discrepancy between the contract drawings and these specifications, it will be the hardware supplier's responsibility to bring it to the attention of the Consultant prior to tendering.

15.10 Any and all painted surfaces damaged shall receive two (2) field coats of approved touch-up paint. Submit colour sample of touch-up paint for approval prior to application. Touch-up entire component as per manufacturer's instructions.

15.11 Install polycarbonate roof panels into extruded frames with allowance for expansion and contraction without leakage.

15.12 Fasten roofing panels to structure at 450 mm maximum spacing. Seal between glazing and exterior closure strip with butyl glazing tape, apply one bead of sealant and install approved snow guards.

15.13 Provide 12 mm x 3 mm pressure sensitive butyl tape between base plate and concrete slab.

15.14 Embed aluminum channel windskirt in pressure sensitive butyl tape.

15.15 Maintain access to all hardware adjustments. Notch framing materials, weather-stripping, etc.

15.16 Maintain 9 mm clear space below stainless steel junction box access cover for condensation weepage.

16 CAULKING

16.1 Caulk butt joints in glazing.

16.2 Caulk all components as required for water tightness.

17 FINAL CLEANING

17.1 On completion of the work, wash down and wipe dry all surfaces. Remove stains and smudges from aluminum and glazing and other finished surfaces. Wash, polish and wipe dry.

17.2 Replace all broken, damaged or scratched glazing.

17.3 Use appropriate apparatus and cleaning materials. Clean manufactured articles in strict accordance with the manufacturer's directions in each case.

17.4 Upon completion of final cleaning, remove cleaning equipment, materials and debris from the site.

18 MATERIALS

18.1 STRUCTURAL COMPONENTS

All extruded aluminium columns, posts and beams to be designed by a Professional Engineer currently registered in the Province of Ontario.

(A) Aluminum Plate and Sheet: ASTM B209M, Alloy 6061-T6, anodizing quality.

(B) Aluminum Extrusions: ASTM B221M, Alloy 6063-T6, ASTM B209M, Alloy 6061-T6, anodizing quality.

(C) Welding Rods, Aluminum: 5356 alloy.

Column bases: 152 x 152 x 12.7 mm base plates, edges to be neatly trimmed. With minimum (203 mm) long square hollow section sleeves welded on base plates, section size to suit column, lightly sandblasted. Finish to match column. Allow cut-outs in base plate for conduit rough-ins as required.

Standard safety bar for door: minimum 50 mm dia. alum. tube securely anchored to column and concrete pad. Paint orange.

18.2 ROOF COMPONENTS

Main extrusion: aluminum AA6063-T6 or Alloy 6061-T6 hollow section minimum 2.5 mm thick: supports canopy skylight and contains upper glass channel.

Vaulted and/or compound-peaked skylight supported by aluminum 38 x 76 mm hollow section rib. Polycarbonate Glazing: Translucent, extruded-polycarbonate sheet with cellular cross section that provides isolated airspaces and coextruded with a UV-protective layer, min. 6 mm thick medium bronze colour, Lexan Thermoclear by GE Polymershapes or equivalent polycarbonate.

Glazing for gable ends of skylight: Min.6 mm thick clear Thermoclear (Lexan) polycarbonate panels or equivalent polycarbonate.

Roof trim, top glazing member and snow guard: extruded aluminum, integrated or separate with profile as per drawings.

18.3 FASTENINGS

All fastenings to be stainless steel, Type 304.

Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

Exposed fastening devices to be finished to match adjacent surfaces.

Use fasteners compatible with material through which they pass.

Column anchors: zinc alloy shield, GRIPZEN 8025-00300 or equivalent and 1/2" stainless steel anchor bolts complete with stainless steel washers and lock washers.

Aluminum vertical glazing mullions fastening screws: No 8 stainless steel threads to be wrapped in Teflon tape.

18.4 GLAZING

Tempered Clear Safety Glass; to CAN/CGSB-12.1 Type 2, Class B. Float tempered for platform mounted shelters. Thickness: minimum 10 mm for walls; 5 mm for doors. Panel sizes as per drawings.

(i) Glazing Gaskets: Neoprene, EPDM, thermoplastic or other approved material, of sufficient thickness to be 25% compressed when installed. Gaskets shall have a 13.8 MPa (2000 psi) tensile strength, Durometer A hardness of 50, plus/minus 5, resistance to permanent set 30% maximum, minimum elongation at break of 300% and resistance to ozone showing no cracks.

(ii) Glazing Tape: Pre-shimmed, extruded, ribbon shaped, non-drying, non-skinning, non-oxidizing polyisobutylene tape with continuous synthetic rubber spacer rod, sufficiently wide and thick as to completely cover bite area of glazing unit when unit is pushed into place.

(iii) Shims, Spacers and Setting Blocks: 45, 50 and 90 Durometer A hardness plus/minus 5 respectively, neoprene rubber. Resistance to sunlight,

weathering, oxidation and permanent deformation under load shall be prime essentials of shims, spacers and setting blocks.

18.5 GLAZING FRAMES AND WALLS

Horizontal mullion: aluminum extrusion with aluminum snap-on glazing mount and push-in type neoprene glazing seals.

Horizontal bottom wind skirt: two part mechanically fastened extruded aluminum channel assembly and push-in type neoprene glazing seals.

18.6 DOORS

Door and fixed glazing frame: frames to be extruded aluminum with minimum wall thickness of 3 mm; colour: brown. Frame dimensions as per drawings.

Glass: 5mm clear tempered glass, with aluminum snap on glazing mount and push-in type neoprene seals.

18.7 KEYING

All doors shall have keyed cylinder locks on exterior side only. Interior side to be blank cover (no thumb latches).

Supply to each leaf one maximum security deadlock with lateral bolt swing. There are only external cylinders on these deadlocks.

Lock type AR MS18500A - 24.6 mm BS. Cylinder type - Corbin 525A x Russwin 6D4 or 6D2 Keyway x 29 mm - C26D.

Keying shall be as follows:

(a) All cylinders subject to Line Grand Master Key.

(b) All cylinders subject to Station Master Key and,

(c) Shelter doors - keyed alike.

All keys and cylinders shall be full visual key code stamped on key bow and

cylinder face. DO NOT SUPPLY ANY COPIES OF GMK.

Provide blank cover plates for cylinders and turn cylinders over to Owner.

18.8 HARDWARE

All door hardware shall comply with Barrier Free Design Standard CAN/CSA-B651-M90, Article 4.2.6., Door Hardware.

Hinges: all exterior doors shall be provided with top to bottom continuous hinge. Continuous hinges must be made of 14 gauge, Type 304 stainless steel and be full mortise application. Hinge type Markar FM300.

Door closer: top line product, heavy duty, single armed, overhead concealed, 180 degree opening, maximum required force for pushing or pulling to be 38N, delay closing feature to meet Barrier Free Design Standard requirements.

Door push bars and pulls: all doors shall be equipped as follows:

(a) Equipped with a push bar on the push side only. It shall be Alumicor type #221 or equivalent, clear anodised for the full width of the door. The shop drawings shall show the push bar, type, size, connections, etc.

(b) Equipped with a door pull on the pull side of the door. It shall be Alumicor type #220 or equivalent, clear anodised, 300 mm high pull. The shop drawings shall show the door pull, type, size, connection details, etc.

Locking devices for all shelter doors: supply to each leaf one maximum security deadlock with lateral bolt swing. There are external cylinders on these deadlocks. Supply blank cover on interior. Lock type AR MS18500A - 24.6 mm BS. Cylinder type - Corbin 525A x Russwin 6D4 or 6D2 Keyway x 29 mm - C26D. Turn over to Owner and provide blank cover plates. Cylinders to be keyed alike.

Door controls: all doors to be fitted with overhead concealed channel type door stay and holder. Size as required. Type: Rixson 1-400 Series.

Weatherseal: provide weatherseal to head and jambs of all exterior doors. Door seal to be aluminum with sponge neoprene min. 6 mm thick, width to suit frame stop. Type: Canada threshold W14. Door sweeps shall be brush type: W24S.

Kick plate: provide stainless steel kickplate on the push side of each door. The

kick plate shall be 1.63 mm thick, 150 mm high for the full width of the door.

Door hold-open and stop: provide approved positive locking hold-open device mounted at safety bar and door as shown on drawing. Provide approved door stop, mounted with door hold-open device. Colour: brown.

18.9 BENCHES

Wood components shall be #1 clean Maple select or better, D4S, straight and free of splits and with eased edges. Each piece to be clean cut each end, true and spare, all pieces the same length +/-2 mm for each specific bench.

Carriage bolts shall be 6 mm diameter flat head stainless steel and countersunk below wood surfaces. Submit sample for approval.

Arm rests shall be 38 mm diameter aluminum tubes placed on 578 mm centres and be installed to resist a force of at least 1.3 kN applied vertically or horizontally.

All exposed edges and surfaces shall be smooth and free from burrs and sharp projections.

All mounting and anchor hardware shall be included.

All aluminum components shall be finished in accordance with finishes specified in Section above. Colour: GO green.

Benches shall be inspected by Engineer on the premises prior to shipping.

18.10 HINGED MAP FRAME

Map frame: 1 076 mm x 895 mm (outside dimensions) frame, complete with side hinge, glass, diffuser and all required hardware. The display panel shall be tamper-proof and vandal-resistant. It shall be extruded aluminum with a glass cover mounted in an extruded aluminum frame. The aluminum shall have a anodized finish, colour as selected by Metrolinx. To be mounted on the interior face of shelters, at locations as detailed on the Contract Drawings.

18.11 POWER ASSISTED DOOR OPERATORS

Automatic Door Operator: ANSI 156.19, surface mount, full housing, power open and spring close, complete with CSA labelled electro mechanical motor, operating temperature between -34 deg C and 71 deg C, maximum un-assisted opening force of 38 N.
Model: Magic Access, complete with Magic Touch feature as manufactured by Stanley Magic Door (Division of Stanley Canada Ltd.), or approved equal.

Activator Switches: Interior; jamb mounted push button switch N/S-1, complete with tamper resistant security screws and tool. Exterior; post mounted push button with stainless steel push plate 6R5, complete with tamper resistant security screws and tool.

Post, Anchorage and Concrete Base: Post, anchor bolts, concrete base and low voltage conduit as detailed on the Contract Drawings.

AC and low voltage wiring, conduit and electrical boxes by Division 16.

Key Lock Switch: provide key switch to de-activate power assisted door operator buttons in hold-open position. Keying shall match shelter doors - see above. All key lock switches to be keyed alike.

Switch to be single pole, double throw (SPDT) suitable for cylinder supplied as specified above. Switch to be mounted on heavy duty 3 mm thick aluminum narrow single gang plate. Provide tamper resistant security screws and tool.

Operator to meet all requirements of ANSI Standard 156.19 and CSA approvals.

18.12 ABOVE DOOR LOUVERS

Demountable louver: minimum 1.27 mm pre-finished aluminum louver as detailed on drawings complete with pre-painted aluminum retention frames mounted to structural frames and insect screens.

18.13 JUNCTION BOXES

Provide one full width stainless steel junction box at each end of shelter as detailed.

Removable access cover to come complete with tamperproof closures.

Emboss or engrave "ELECTRICAL WIRING" on one access cover and “COMMUNICATION WIRING" on the other access cover for each shelter.

18.14 SEALANTS

One part silicone rubber conforming to CGSB 10-GP-18M to suit application.

18.15 ELECTRICAL

(i) General: Bearing CSA or Electrical Safety Authority inspection approval.

(ii) Grounding: Provide a grounding system to the authorities (ESA and Metrolinx’s) approval. Grounding shall meet the requirements of Ontario Electrical Safety Code.

(iii) Wiring: TW90, RW90, TWU90, TECK90, RWU90, AC90 (X-LINK), sized for 75 deg C.

(A) Conductors: Copper with 1000 Volt insulation, unless noted otherwise. Heater wiring shall be as a minimum temperature rated as per the manufactures recommendation and terminated with appropriate connectors and tape.

(B) Provide fish wire in all empty conduits.

(C) All wire underground to be direct buried rated with 1000V rated insulation. No splices are allowed below grade.

(iv) Conduits: Exposed conduits not permitted.

(A) Unburied Conduit: Rigid galvanized epoxy coated steel as permitted by code unless stated otherwise.

(B) Direct Buried Conduit: Rigid PVC conduit with ground, as permitted by code.

(C) Concrete Encased Conduit: Rigid PVC conduit with ground, as permitted by code.

(D) Rigid hot dipped, galvanized Epoxy or PVC coated.

(E) Expansion Couplings: Purpose built, for conduits cross construction and expansion joints.

(F) Lighting and Power Circuit Conduits: Minimum 21 mm diameter

inside shelter unless otherwise stated. Between handholes 53 mm.

(G) Buried Conduit Or Conduit Embedded In Concrete: Minimum 25 mm diameter.

(v) Conduit, Cable or Equipment Supports: Concealed, corrosion resistant metal or preserved wood. Where cutting of support materials is required, treat cut ends to maintain suitable protection from deterioration.

(vi) Lighting Fixtures and Lamps LED: Easily maintained, gasketed water and vandal resistant. Support outlet and junction boxes independently of conduits running to them. Fixtures controlled by platform lighting circuits.

(A) Usually lighting fixtures are fed from platform light

(B) Lighting Contactors: Electrically held complete with enclosure and control transformer. All lighting contactors to be Square D No. 8903 series or approved equal, electrically held, complete with enclosure and control transformer. Switch shall have contacts to suit. Provide a programmable controller timer as made by Siemens, Square D or approved equal, complete with an variable Day light.

(vii) Outlet Boxes, Pull Boxes, Junction Boxes, Terminal Boxes: CSA approved, listed, labelled and comply with OESC requirements, requirements NEMA 4X, complete with suitable securing lugs, conduit connectors, knockouts, escutcheons, covers and any other required accessory. All boxes and fitting to maximum finish of conduit system used.

(A) Duplex Power Receptacles: 120V GFCI with aluminum face plate, gasketed and rated for outside applications.

(B) Surface Mounted Boxes: FS type, solid construction.

(C) Boxes With Both Power and Communication Outlets: Barriered.

(D) Boxes for Submergence: Bearing submersible rating with all fittings designed and installed to prevent the entry of water.

(viii) Accessories: Fittings, drains, plugs, cover plates, bushings, clips, rods and accessories as required and appropriate.

(ix) Electric Radiant Heater (as required by tender documents): CSA approved and shall bear CSA or Electrical Safety Authority certified

organization accredited by Standard Council of Canada.

Each unit shall be safety guard fitted, waterproof, shortwave infrared type, suitable for outdoor use, industrial and commercial applications. Safety guard, anodized aluminum reflector and built-in adjustable directional system components shall be factory assembled. All components shall be corrosion resistant.

Heating element(s) shall be:

(A) tubular quartz with tungsten coil and shall be glare reducing,
(B) thermal shock resistant for outdoor use, and
(C) able to withstand vibrations typically encountered on rail platforms (averaging 3.4 mm/s). Thermal shock and Vibration testing shall be conducted by an independent qualified third party.

System power to include the following features:

(A) Heaters shall be suitable for operation with 120V/208V/240V AC, single phase, and 60 Hz electrical service. Recommended power is 3000W per heater at 208V service.
(B) All shelter heaters shall be fed from an adequately sized dedicated Shelter Heater Panel, minimum 225 Amp, 3 phase. Shelter power distribution conductors shall terminate in a NEMA 4X lockable enclosure, complete with backboard. All terminations shall end on a terminal block inside enclosure. All power sources shall have local breaker disconnects.
(C) Ground fault interrupt breakers are required for each heater circuit.
(D) Power conductors to be underground rated.
(E) Wiring shall meet radiant heater temperature specification.
(F) All exposed conduit, junction boxes and fittings shall be rigid galvanized steel PVC or epoxy coated.
(G) Liquid-tight conduit and Armored (AC) cables are acceptable only if they are mounted inside existing structural members. Use weatherproof fittings.

System controls to include the following features:

(A) Each radiant heater shall be independently turned on by its own remote momentary push button (button colour green, recessed type, heavy duty, Allan-Bradley, Siemens or approved equal).
(B) Thermostat: remote bulb type.
(C) Each shelter heater shall be controlled by a PLC or an adjustable

timer that allows 10 minutes of heating at a time. The controls shall be designed to prevent operation should the push-button be jammed in the closed position.

(D) The Shelter Heater Panel shall be controlled by an adequately sized, minimum 200 Amps contactor installed in the Electrical Room. The contactor shall be controlled by one central Thermostat. The sensing unit, shall be mounted outdoor in a safe, central location, which will allow heater operation only if the ambient temperature is below 10°C.

(E) The Heater Panel shall be on an H-O-A (Hand-Off-Auto) Selector Switch mounted in the Electrical Room, within 6' (1.83m) of Shelter Heater Panel.

(F) Heater shall be suspended by chains or threaded rods. Heaters shall be installed at a minimum height of 2440mm (8') from the underside of the heater to finished floor. The radiation angle should be between 60 and 75 degrees.
Approved manufacturers: Chromalox, Ouellet, Caloritech, Solaira Heaters or approved equivalent.

(G) Heater controls shall be in 120V or less.

(H) Each heater shall be provided with its own controls complete with a local momentary push to start. If more than one radiant heater is used in a shelter, each heater to be independently controlled by its own push button.

(x) P.A. Speaker: Refer to Metrolinx Train Engineering Design Manual EN-0402-05 for hardwire and accessory requirements.

(xi) Install, program, set-up and adjust all equipment as indicated and/or required and complete all commissioning.

(xii) Door Entry Wiring: Provide concealed in complete metal conduit raceway system.

(xiii) Conduits: Conceal conduits, support conduits from the shelter structure. Nails or tie wires are not acceptable.

(A) Maximum armored cable (AC) length of 3 m is acceptable in the roof underside, use rigid galvanized epoxy coated conduit otherwise.

(xiv) Seal tight conduits used to connect motors and other vibrating equipment, minimize runs.

(xv) Electric Radiant Heater: Securely mount heaters at locations indicated.

(xvi) Equipment Mounting Heights: Mounting height of equipment is from finished floor to the underside of equipment unless indicated otherwise. Verify unspecified heights, dimensioned locations and ensure indicated heights in accordance with current barrier free access requirements before installation.

19 EXECUTION

(a) Installation - General

(i) Set work plumb, aligned, level and true to plane with full bearing on supports, to manufacturer's instructions.

(ii) Fasten shelter to cast-in anchor bolts or to concrete bases with expansion anchors.

(iii) Connect electrical power service to power distribution system in accordance with the project electrical requirements.

(iv) Securely fasten display units, entrance guardrails, benches and ventilation louvres.

(b) Installation – Glass And Glazing

(i) Handle and install glass in accordance with manufacturer's directions. Prevent nicks, abrasions and other damage likely to develop stress on edges.

(ii) Accurately size glass to fit openings allowing clearances recommended by Glass Association of North America. Cut glass clean and free of nicks and damaged edges. Grind smooth and polish exposed glass edges. Do not cut or abrade tempered, heat treated, or coated glass.

(iii) Without limitations, cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials; loosening or rattling of glass; leaking of glazed joints will be rejected.

(iv) Use setting blocks and spacers as required to properly support glass, centred in place in the glazing space independent of the materials and to uniformly distribute its load, with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.

(A) Use a minimum of 2 setting blocks, located at the quarter points.

(B) Locate spacers at jamb edges of glass, uniformly spaced at 600 mm o.c. maximum, and 300 mm maximum from top and bottom.

(v) Assess coloured glass units for colour uniformity and arrange to avoid abrupt variation in appearance.

(vi) Leave labels on glass until it has been set and inspected and approved. Leave glass whole and without cracks, scratches or other defects and with setting in perfect condition at completion, to the approval of the Engineer.

(vii) Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with perfect materials. Units producing distorted vision will be rejected and replaced at the reasonable discretion of the Engineer.

(viii) Seal glass-to-glass joints with sealant.

(ix) Apply universal barrier free symbol decals to door glazing panel, free of wrinkles, air bubbles and other defects.

20 MEASUREMENT AND PAYMENT

20.1 Adjusting And Cleaning

(i) After completing installation, inspect exposed finishes and repair damaged finishes.

20.2 Measurement and payment for work of this Section shall be in accordance with the Schedule of Prices listed in the Form of Tender.

END OF SECTION