Engineering Bulletin

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Facilities Architecture and Engineering

DRM (R5) Bulletin 001

Amendment Notice: Electrical Updates

This Bulletin applies to and amends the following Document:

GO Design Requirements Manual (GO DRM) - GO-DRM-STD-2017-Rev5

- Section 5.2.10.1.10: Removed the requirement of the spare power and communications backbone conduits across the platform
- Section 5.2.2.26.12.1 – Provided further clarification on conduit requirements.
- Section 5.2.26.12.2: Removed the requirement of the 8x53 mm conduits for power communications between communication rooms.
- Section 5.2.26.13.4: Removed communication and the power communication conduit requirement for platforms.
- Section 5.5.1.5.1: Changed the section language to provide more clarity on the scope of work of the Contractor and Metrolinx I&IT as reflected in the Metrolinx I&IT Telecommunication and Systems Standard Revision 02 updates.
- Section 5.5.1.5.2: Revised the naming of sub-section (c) from "Poles and mounting standards" to "Poles mounting and placement standards."
- Section 5.5.1.5.2: New placement requirements have been included under sub-section (c) in line with the recent design and I&IT standards.
- Section 5.5.1.5.2: Provided more clarity on the shop drawing submittals.
- Section 5.5.1.5.3 (a): Replaced the word "devices" with "Monitor / Digital Media Player" and clarified the requirements for each digital screen.
- Section 5.5.1.5.3 (c): Replaced "Multimode" to "Singlemode" fibre to reflect with I&IT standards.
- Section 5.5.1.5.4- New requirement for digital signage NEMA enclosure added in sub-section (f).
- Section 5.5.1.5.4 (a): Replaced "for receivers and fibre terminations" to "for receivers and all cable terminations"
- Section 5.5.1.5.4 (e): Provided more clarification on NEMA enclosure locations for digital screens.
- Section 5.5.1.5.5: Provided more clarity on the power and communications conduit and cable requirements.
- Section 5.5.1.5.6 (c): Added "See Technical Requirements for Backup Required Time in this document (DRM)" and removed "If the existing UPS does not provide enough capacity or if there is no UPS whatsoever"
- Section 5.5.1.5.7 (c): Revise statement to include "or approved equivalent."

Amendments to the GO DRM are provided in the following attachment:

- Revisions to GO DRM September 2023 – Electrical Updates.

The Bulletin is available for internal and external users to download via the Metrolinx public download site (www.gosite.ca/engineering_public/GO Design Requirements Manual).

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5.2.10.1 Raceways and Conductors

5.2.10.1.1 Raceways and branch circuitry shall be implemented to minimize the failure of a complete system due to the failure or malfunctioning of any single electrical component.

5.2.10.1.2 Distribution minimizing conductors of different circuits sharing common raceways and pull-boxes, etc., shall be implemented. No free air cabling is allowed. All wiring shall be in conduit of the proper type, size and material as identified in the DRM and GO Specifications

5.2.10.1.3 Raceways shall not exceed a maximum of 40% capacity.

5.2.10.1.4 Communication backbone raceways sized 53 mm shall not exceed a maximum of 30% capacity for communication cabling.

5.2.10.1.5 Raceways selected shall suitably resist mechanical damage and environmental deterioration effects. In particular, special attention shall be applied to corrosion inhibitors and protective coatings or treatments on surface-mounted conduit in underground areas (e.g., tunnels, below-grade electrical rooms, Bridges and parking structures, etc.). A minimum of 30% spare conduits with ground wire and pull-cords shall be provided for future use, coordinated with Metrolinx. Bundling of cables with different operating voltages is not permitted. Empty conduits shall be sealed at the ends.

5.2.10.1.6 A minimum of 12 AWG stranded copper wire green insulated RWU90 below grade, and RW90 above grade shall be placed inside each raceway. This wire shall be used as a tracer wire inside a buried raceway for the purpose of locates after installation.

5.2.10.1.7 Slack wire shall be provided. In all runs, the amount of slack shall be no less than 1.0 m at each termination point and 600 mm at each pull point. Access wire shall be neatly coiled and be available for future use.

5.2.10.1.8 When installing wires in an existing raceway, it shall be the responsibility of the installer to ensure that new wires are neatly installed and tied together with all existing wiring.

5.2.10.1.9 Drip loops shall be provided on all outside hanging raceways or conductors.

~~5.2.10.1.10 Backbone spare raceways for electrical and communications shall be provided across the length of the platform with separate hand holes. The spare raceways shall consist of nine (9) 53mm power conduits and nine (9) 53mm communication conduits with ground wire and pull-cords for future use. Empty conduits shall be sealed at the ends.~~

~~5.2.10.1.11~~5.2.10.1.10 Refer to Metrolinx Standard Specifications: Rail Corridor Raceway Requirements, Raceway for Electrical Systems 36 05 34 and Electrical Conductors and Cables 26 05 21 Refer to Metrolinx electrification standards for electromagnetic interference (EMI) protection of devices and cables.

~~5.2.26.13~~5.2.26.12 Communications and Hub Rooms Communications Connectivity

5.2.26.12.1 A minimum of nine 53 mm conduits shall provide connectivity from the Main Communications Room to each Hub Room and Mini-Hub Room. Note that these nine conduits are only to be used to provide communication cabling and should not be used to provide power. Additional power conduits should be provided in accordance with other sections of the DRM"~~the required number of power conduits are not part of these nine dedicated communication conduits~~. If more than one Hub Room is required, then each Room must have its own direct

dedicated set of conduits linking it to the Main Communications Room, which may be designed as a pass-through layout. Spare communication conduits (excluding tracks and signals) shall be 53 mm.

~~5.2.26.13.1~~5.2.26.12.2 If more than one Communications Room is on-site, a minimum of nine (9) 53 mm (2") dedicated conduits shall provide connectivity from one Communications Room to the other. Refer to the IT Telecommunications and Systems Document for the list of equipment. ~~If more than one Communications Room on site, provide eight 53mm conduits for communications power to each Hub Room and Mini-Hub Room from the Main Communications Room. A minimum of nine 53 mm dedicated conduits shall provide connectivity from one Communications Room to the other. Refer to I&IT Telecommunication and Systems Standards for list of equipment.~~ Spare communication conduits (excluding tracks and signals shall be 53mm.

~~5.2.26.14~~5.2.26.13 Conduit Infrastructure

~~5.2.26.14.1~~5.2.26.13.1 Communications conduit shall be included in all rail platforms, power, communication and mechanical systems.

~~5.2.26.14.2~~5.2.26.13.2 Power shall be run in a dedicated duct bank. Communications shall be run in a dedicated duct bank.

~~5.2.26.14.3~~5.2.26.13.3 Power and Communications shall run the entire length of the platform and be fed from the Systems designated Main Electrical Room and Main Communications Room, respectively.

~~5.2.26.14.4 For platform communications provide nine 53mm conduitsand eight 53mm conduits for communication power for the entire length of the platform.~~

~~5.2.26.14.5~~5.2.26.13.4 Provide routing of all conduits with the capability of connecting the Mini-Hub rooms and terminating at each end of the platforms in hand-wells that can provide future connectivity to rail corridor systems.

5.5 Fixtures and Furnishings

5.5.1 Digital Signs at Line Stations, Terminals and Carpool Lots

5.5.1.1 Suite of sign types:

a) Digital Departure Signs (Train and/or Bus);
b) Digital Platform Specific Signs (Train or Bus);
c) Digital Parking Counter;
d) Digital Wayfinding Interactive Kiosks (TBD); and
e) Infotainment.

5.5.1.2 Digital Departure Signs (Train and/or Bus)

5.5.1.2.1 Location Criteria – Digital Departure Sign (Train and/or Bus) shall be located at:

a) Inside Station/Terminal buildings, adjacent to the waiting area; mounted at barrier-free height as per OBC and AODA regulations;
b) At Rail Platform Access Points (platform access area, entrances to tunnels, bridges, parking structures, side platforms – via ramp and/or walk-on);
c) At Primary Bus Loop Access Point(s); and
d) At Car Pool Lots shall be located at remote parking lot locations (at GO's discretion).

5.5.1.2.2 Placement & Appearance Criteria

a) Information and Service Modules to be used for interior and exterior applications, with modules adjusted as required, based on site conditions (in consultation with GO);
b) For exterior applications, integrate within the building envelope where possible and provide weather protection i.e. building canopy;
c) Provide independent weather protection if integration with building canopy is not possible (in consultation with GO);
d) Where an Information or Service Module cannot be established due to site conditions, consider suspending the screen from the underside of the canopy. At remote locations, consider implementing the concept of the suite of shelters;
e) At carpool lots, integrate into the carpool shelter; and
f) Where possible, recess eye-level digital signs into walls to prevent potential injuries. Install such that the face of the screen is flush with adjacent surfaces. Ensure the entire screen is visible from all angles. Conceal all conduits, connections and infrastructure.

5.5.1.2.3 Monitor Size - Use current I&IT Telecommunication and Systems ~~s~~Standard (MX-IIT-STD-001).

5.5.1.2.4 Number of Monitors

a) Minimum one Digital Departure Sign for Train, plus one for Bus, or one combination Train and Bus Digital Sign (confirm with GO); and
b) For larger sites with significant service, confirm the number of monitors for each of the above with GO.

5.5.1.3 Digital Platform Specific Signs (Train or Bus)

5.5.1.3.1 Location Criteria - Rail

a) Island Platforms: three sets of back-to-back Digital Platform Specific Signs (Train) at each track used by GO;
b) Side Platforms: three sets of back-to-back Digital Platform Specific Signs (Train) at each track used by GO;
c) Avoid clustering of digital signs in close proximity; Digital Departure Sign locations take precedence over Digital Platform Specific Signs;
d) Always locate one set of Digital Platform Specific Signs at the mini platform and the other two equally spaced;
e) Digital Platform Specific Signs should be mounted to the underside of the rail platform canopy; and
f) Ensure digital screens are outside of train envelopes.

5.5.1.3.2 Location Criteria - Bus

a) At each bus platform at Line Stations, Bus Terminals and Car Pool Lots: one set of back-to-back Digital Platform Specific Signs (Bus);
b) Locate digital signs consistently at the driver's end of each platform, outside of the road envelope; and
c) Mount Digital Platform Specific Signs from the underside of the canopy, where possible. If not possible, use a standard GO pole. Ensure poles are away from the barrier-free path of travel.

5.5.1.3.3 Placement & Appearance Criteria

a) Follow GO standard drawings for poles and canopy mounts;
b) At rail platforms, place static platform numbers on trackside; and
c) At bus platforms, place static platform numbers on road side.

5.5.1.3.4 Monitor Type/Size

5.5.1.3.4.1 LED type; Use current I&IT Telecommunication and Systems ~~s~~Standard (MX-IIT-STD-001)

5.5.1.3.5 Number of Monitors

5.5.1.3.5.1 Set of two screens, back-to-back, at each location.

5.5.1.4 Digital Parking Counter

5.5.1.4.1 Location Criteria - At vehicular entrance(s) to parking structures, visible when approaching by road

5.5.1.4.2 Appearance - The look and feel to be integrated with the GO Station ID Totem suite.

5.5.1.5 Technical Requirements

5.5.1.5.1 Process Requirements:

a) Contractor shall supply and install all Display Signage related components and hardware, including (but not limited to): Displays, Digital Media Players, media converters, enclosures, encasements, and mounting hardware. All display accessories (i.e.: remote controls and user manuals) must be delivered to the Metrolinx I&IT representative during commissioning~~The digital signs will be supplied, commissioned and maintained by Information and Information Technology (I&IT), except for the Digital Parking Counter~~. Metrolinx I&IT ~~(Business Technology) I&IT will install~~shall install the PCs, routers, and switches in the communications or mini-hub rooms;

~~5.5.1.5.2~~

~~a)~~b) Contractor shall supply and install all ~~Capital Project Delivery will perform the physical installation of the monitor~~ interconnecting cables, power supplies, power cabling, and data cabling to the monitors from the communication or mini-hub rooms;

~~b) Screens and digital media players (DMP's), CPU's to be provided by IT and installed by the Contractor. Pick up from storage to be by Contractor;~~

c) Contractor shall supply and install all t~~T~~ransceivers, cabling terminations, communications and mini-hub room racks, and all civil work (conduits, pulling of wiring, pole footings, pole structure, mountings, NEMA boxes, etc.) ~~to be by the Contractor~~;

~~c)~~d) Fully installed and tested solution by the Contractor; and

~~d)~~e) Contractor shall perform the c~~C~~ommissioning by the Contractor in coordination with Metrolinx I&IT ~~(Business Technology) IT~~ and Station Operations.

~~5.5.1.5.3~~5.5.1.5.2 Technical Design Requirements:

a) Each Digital Sign location must be shown on the electrical drawings and must include data and electrical outlet locations as well as any enclosures or other infrastructure associated with these signs:
   1) Monitors: (Use current IT standard);
   2) Digital Media Player (DMP):(Use current IT standard).

b) Contractor to provide transceivers/receivers, associated with cabling type and the balance of digital sign components. Provide receivers with minimal profile; by Extron or approved equivalent – reference products:
   1) Extron DTP HDMI 4K 330 Transmitter/ Receiver for shielded cable; and
   2) Extron HFX 100 Transmitter/Receiver for fiber.

c) Poles ~~and~~ mounting and placement standards:

   1) R~~r~~efer to digital signage location criteria and requirements; GO pole conceptual design drawings are under development. Shop drawings are to be developed by the Contractor and shall be reviewed and stamped by a licensed professional engineer in coordination with digital signage equipment requirements;

   2) Sign locations shall be coordinated with CCTV camera placement so as not to block or partially obstruct the viewing areas of the CCTV cameras;

   3) All digital signs and cabling within the area of influence are subject to GO Electrification ~~Traction System~~ Standards, Drawings and Specifications where applicable; and

   4) Mounting hardware shall be compatible with the screen type and load requirements of indoor and outdoor digital signage systems. Also, mounting hardware should allow the monitors to be tilted to achieve a non-reflective angle for best viewing.

5.5.1.5.3 Connectivity Requirements:

a) Each of these ~~devices~~ digital monitors/digital media devices requires a minimum of one CAT6 network outlet. These network outlets are to be cabled back to the nearest telecommunications room network rack switch equipped NEMA box, or mini-hub room, and terminated in accordance with the copper horizontal cabling requirements; ~~and terminated as per the copper horizontal cabling standard;~~

b) CAT6 shielded cable for devices placed within 90m from the Communications (Hub) Room; and

c) Singlemode~~Multimode~~ 6-strand fiber for installation beyond the 90m mark.

5.5.1.5.4 NEMA Enclosure Requirements:

a) NEMA enclosures shall be provided for receivers and ~~fiber terminations~~ all cable terminations ~~-~~at digital screens;

b) NEMA/EEMAC Type 4X IP-65 with a solid door capable of accepting box lock requested by IT Field Services and physically separated into two compartments to isolate power from communications devices;

c) BEL R SS Series EEMAC/NEMA 4-4x-12 / IP-65 or Hoffman CONCEPTTM Type 4x or any other box meeting NEMA Type 4X IP-65, physical separation capabilities and box lock requirements;

d) The enclosure size selection shall be based on the electrical and electronic equipment to be housed inside the box;

e) All NEMA enclosures shall be secured ~~to be concealed within poles~~ and located between back-to-back screens~~or finishes adjacent to screens~~ in the case of a single screen installation, NEMA enclosure shall be placed behind the screen or finishes adjacent to the screen. Visible NEMA boxes shall not be accepted. Provide access to concealed NEMA boxes. Do not drill or perforate the integrity of the NEMA box in any manner; and~~.~~

f) Feeding NEMA enclosures through the top is not permitted due to moisture ingress.

5.5.1.5.5 Conduit Requirements:

a) Provide a minimum of o~~O~~ne 53 mm conduit for power and a minimum of one separate 53 mm conduit for data from the communications ~~(hub)~~or mini-hub room ~~all the way~~ to the last pull point before the device; from the last pull, use a 25 mm conduit to the device;

b) Follow DRM in terms of conduit selection (PVC for buried conduit, RGSEC (Rigid Galvanized Steel Epoxy Coated at the factory) for all exposed locations such as tunnels, etc.); 53mm liquid-tight conduits from the NEMA enclosure to the monitor mounting bracket. Provided with drip loops and easy release on the NEMA enclosure side;

c) All conduits and connections to be concealed within poles or adjacent finishes;

d) Spare conduits for digital screens shall be 53 mm; and

e) All cables used in conduits shall be outdoor rated, and any cables installed in underground conduits or duct banks shall be of burial-rated cable grade. All cabling should terminate into a media patch panel inside the NEMA enclosure accordingly – copper or fibre.

5.5.1.5.6 Power Requirements:

a) Dedicated single 5-20R duplex receptacles shall be used;

b) Outdoor locations require sizing based on the external enclosure and screen power draws. All receptacles must be GFI Type, which may be reset at the NEMA enclosure. This is to be coordinated at the time of design and must adhere to DRM. All field-assembled equipment installed in any NEMA box shall have final accredited certification as approved for use by the appropriate authority; and

c) All devices shall be UPS backed-up. ~~If the existing UPS does not provide enough capacity or if there is no UPS whatsoever,~~ ~~p~~Provide a Surge Protection Device in the local panel where the monitor and DMP ~~is~~ are fed from. This device shall be appropriate for the specific panel at each location. See Technical Requirements for Backup Required Time in this Document (DRM).

5.5.1.5.7 Data Requirements:

a) DMP~~'~~s to be placed in Communication (Hub) Rooms;

b) Assume one DMP per digital display. (confirm with IT); and

c) For design assumptions, use Cisco Interactive Experience Client 4650 or approved equivalent.