METROLINX

Engineering Bulletin

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Facilities Engineering Assurance

FEA-003

Amendment Notice: Generator Enclosure Requirements

This Bulletin applies to and amends the following document:

- GO Design Requirements Manual (DRM), GO-DRM-STD-2017 Revision 3, dated February 2020

This Bulletin revises requirements for generator enclosures currently in the DRM (Feb. 2020) to ensure the most effective enclosure solution is implemented based on the prevailing site conditions.

The revision mandates that prime rated generators (Prime Generators) be enclosed in a self-contained room, complete with roof, referred to as the Prime Generator Room. The Prime Generator Room will be a separate dedicated room that can be a standalone building or an integrated room in a Metrolinx Facilities Building.

Benefits of requiring a Prime Generator Room as the Prime Generator enclosure include:

- Creating a better customer experience by enclosing industrial objects.
- Increasing asset longevity and improving maintenance savings for Station Operations.
- Better addressing sound attenuation and noise mitigation.
- Ensuring the enclosure solution fits within the mandate of the Architectural Standards.

This Bulletin also updates the Exterior Generator Housing Enclosure (exterior enclosure) requirements currently stated in the DRM. The revision clarifies that in instances where a facility cannot accommodate a Prime Generator Room, a request for an exterior enclosure shall be submitted following the *Procedure for Requesting Deviations to Metrolinx Standard Requirements* for consideration by Metrolinx. Refer to CKH-ENG-PRC-001 for more details. The revision supplements the existing aluminum panel construction option with a new stainless steel solution for exterior enclosures. This ensures the most effective material is used in instances where a Prime Generator room is not possible.

Standard Specification 26 32 00 – Backup Power Supply Generator and 23 11 13 – Fuel Oil System will be updated as part of a future Standard Recommendation to provide additional detailed requirements. This will be carried out in future electrical and mechanical Facilities Engineering Assurance (FEA) updates.

Amendments to the DRM are provided in the following attachments:

- Attachment 1: Revisions to GO DRM Feb. 2020 – Generator Enclosures

On MyLinx the Bulletin is available for staff to download from the Go Manual page.

The Bulletin is available for external users to download via the Metrolinx public download site (http://www.gosite.ca/engineering_public/).

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7.2.2 Generators

The generator shall be provided as a factory tested single unit and rated kW, 120/208 or 347/600 Volts, 3-phase, 4-wire, 60Hz, 1800 rpm. The generator shall be certified to CSA C22.2 No. 100, EEMAC MG1-22.40, and NEMA MG1, and shall meet the requirements of Ontario Electrical Safety Code, ESA, EPA, MOE, TSSA, along with all applicable local codes and regulations. For additional information on generators refer to Metrolinx Standard Backup Power Supply Generator Specification 26 32 00.

7.2.2.1 Noise Matrix Table

Table 41: Generators Noise Levels

kW	dB(A)	Metres
≤ 150	65	7.0
175 to 500	75	7.0
600 to 1200	80	7.0

7.2.2.2 Diesel Engine

The engine shall be EPA compliant with maximum NOx plus HC of 3.87g/(kw/hr).

ULC/CSA labelled double wall construction sub-base mounted steel fuel tank with an enough storage capacity to run the generator set at full load for 48 hours without refueling. The tanks and fueling system has to be accepted by TSSA and equipped with fuel paddling system.

7.2.2.3 Natural or Propane Gas Engine

(For Prime Generators ≤ 150 kVA)

- Include liquid cooled, spark ignition engine.

7.2.2.4 Minimum Required Accessories

- Line circuit breakers
- Dedicated load bank of 100% capacity for each generator (On Site)

There shall be a load bank for testing available on site rather than bringing a load bank onto site and connecting and disconnecting it. This load bank shall be able to be added in steps for testing up to 110 of the generators capacity. The controller shall have provisions for disconnecting a load bank (during exercise) if there is a loss of normal power by an Electrical and Mechanical interlock through ATS.

7.2.2.5 ~~Exterior~~Generator Enclosures

7.2.2.5.1 Prime Generator Room

A Prime Generator room is a separate dedicated room for a Prime Generator that can be a standalone building or an integrated room in a Metrolinx Facilities Building. The Prime Generator Room shall be a self-contained room, complete with roof. If there are instances where a facility cannot accommodate a self-contained room, a request shall be submitted following the *Procedure for Requesting Deviations to Metrolinx Standard Requirements* (refer to CKH-ENG-PRC-001 for more details) for consideration by Metrolinx.

A Prime Generator room shall house the fuel storage unit and all generator accessories including the

Generator Electrical Switchboard and Automatic Transfer Switch. Generator room design criteria shall be in accordance with Generator's Manufacturer's operating requirements and good engineering experience.

The Prime Generator room location shall not impede passenger flow and shall be positioned to not disrupt sight lines and in accordance with CPTED principles. Access to the Prime Generator room shall be controlled entry.

The room shall be separated from the rest of the building by construction with a 2-hour fire resistance rating.

The room must meet all of the Generator's Manufacturer's operating requirements for ambient outdoor temperatures between -40°C to +40°C.

The room shall be sound attenuating, limiting the overall noise to the to the average dB level in Table 41. The exterior of room housing the Generator shall be painted as per site specific requirements.

7.2.2.5.2 Exterior Generator Housing Enclosure

An exterior Generator housing enclosure is an alternative option for Generator Enclosures based on site conditions. In instances where a facility cannot accommodate a self-contained Prime Generator Room, a request for an Exterior Generator Housing Enclosure shall be submitted following the *Procedure for Requesting Deviations to Metrolinx Standard Requirements* (refer to CKH-ENG-PRC-001 for more details) for consideration by Metrolinx. An exterior Generator housing enclosure shall be sound attenuating, limiting the overall noise to the average dB level in Table 41. The housing shall be aluminum or stainless steel (304L or greater) for a weather proof and sound attenuation enclosure.

Interior walls and ceilings shall be insulated with sound attenuating foam, black stainless steel pad-lockable latches, doorkeepers on all doors and zinc die-cast hinges/grab handles.

The Generator housing enclosure must meet all of the Generator's Manufacturer's operating requirements for ambient outdoor temperatures between -40°C to +40°C.

Locate Generator housing enclosure in an inconspicuous location and above any threat of flooding. The Generator shall not be located below grade or adjacent to potential water hazards (restrooms, tunnels, areas that may be affected by firefighting operations, sewer water backups and other disasters).

Table 42: Exterior Enclosure

Exterior Enclosure	
Exterior Weatherproof Enclosure:	• Owner's Common keyed • Compliant with CSA Standard • Sound Attenuated • Capable of withstanding 150mph sustained winds • Designed to resist rainfall angles of up to 45 degrees without interior flooding • Enclosure to be rodent and serpent proof
Construction:	• Stainless steel (304L or greater) for a weather proof and sound attenuation enclosure • Aluminum panel construction for a weather proof and sound attenuation enclosure

	• ~~Power baked paint~~
Roof:	• One piece pitched roof designed to prevent water accumulation
Exhaust System:	• Internally mounted muffler and sound insulating Panels • Catalytic Converter: Include catalytic converter when defined by local codes
Doors:	• Door Hardware: Stainless steel • Doors shall be lockable by padlock • Hardware locks to be keyed the same • Door drip caps designed to keep moisture accumulation off the top of doors • Doors hinged to allow 180 degree opening
Sound Attenuation:	• Generator to be sound attenuated, both interior walls and ceilings shall be insulated with sound attenuating foam • ~~Generator to be sound attenuated~~ • ~~Average dB level, refer to Table F-4~~ Average dB level, enclosure limits overall noise see Table 41 (above)
Block Heater:	• 1500 watt minimum
Space Heater:	• Include inside enclosure, thermostatically controlled to maintain a minimum 10 ˚C, except when engine is running, in accord with CSA C282, 208v
Motorized Louvers:	• Include on air intake to meet CSA C282, level 2 sound attenuated
Emergency Lighting:	• Include inside enclosure, 50 lumens, DC battery powered, two hour operation, in accord with CSA C282
Engine Fluid Containment Pan:	• Sized to 110 percent of available fluid in accord with CSA-C282

obstructions				coverage in any bus bay
Bridges, Connector Walkways				
Bridge main walkway	X		Monitor	Entire length multiple cameras cross coverage overlapping of cameras, no hiding spots or blind corners
Elevators	X		Recognize	Dedicated to view inside elevator, viewing 2-way emergency call for assistance button.
Elevator Vestibules	X		Monitor	Dedicated to view vestibule outside elevator, viewing 2-way call for assistance button and ability to view maximum area around the elevator.
Elevator Lobby/Waiting Area	X		Monitor	Dedicated to view lobby, ability to view entire waiting area. Possibly more than one camera shall be used to achieve 100% coverage.
Stairs / Escalator	X		Monitor	Dedicated camera to cover vestibules not covered by stair cameras
Service Rooms	X		Monitor	Monitor door - may share camera with other service rooms if on same side of building
Entry and Exit points	X		Identify	Identify everyone who enters or exits through entry and exits doors.
Two Way Communication Devices	X		Recognize	On longer bridges it may be necessary to have 2-way call devices, at those locations a dedicated fixed camera shall be installed to view call device.

Table 55: CCTV Camera Placement - Service Rooms, Service Buildings, Bunkers, Devices

Service Rooms/ Other				
Area	***Fixed***	***PTZ***	***Coverage Type (Image Quality)***	***Comment***
Treasury Rooms	X		Recognize	100% coverage, no blind spots
Operations Security	X		Monitor	General area coverage
Holding Rooms	X		Recognize	100% coverage, no blind spots
Security Office	X		Monitor	100% coverage, no blind spots

Secure Corridors	X		Monitor	100% coverage, no blind spots for entire path: Secure corridors to secure areas leading to secure areas. From building entry point to inside secure area 100% coverage, includes loading ramp.
Bus Cash in Rooms	X		Recognize	100% coverage, no blind spots
Service Buildings, Bunkers, Substations				
Perimeter	X	X	Monitor	Strategically place fixed cameras monitoring entire perimeter. One PTZ to monitor and investigate on each side of perimeter.
Communications Room	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building
Electrical Room	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building
Exterior Generator Housing Enclosure	X		Identify	Identify everyone who enters or exits through entry and exit doors
Mechanical Room	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building
Service Room (Storage, High value area)	X		Recognize	Monitor door - can share camera with other service rooms if on same side of building
Prime Generator Room	X		Monitor	Monitor door - can share camera with other service rooms if on same side of building
Substations	X		Recognize	100% General area coverage using fixed cameras around perimeter of substation.
Devices				
TVM, ATM	X		Recognize	Dedicated coverage, shall not be able to read input of pin code
2 Way Call device	X		Recognize	Dedicated coverage of each device.
Gates	X	X	Recognize	Dedicated coverage of each device. PTZ to monitor gate area in addition to fixed
Emergency Call Buttons	X		Recognize	Dedicated fixed camera. (typically only in elevator)