



CI-0107

TAB 1: GUIDING PRINCIPLES
System Safety

SECURITY DESIGN GUIDELINES

Design Area	Guidelines
	<ul style="list-style-type: none"> > Tunnels: shall have at least two circuits for lighting. The tunnel lighting shall have occupancy sensors to reduce the lighting levels when not in use. > Tunnel concrete walls: Shall have painted or stainless steel metal panel raceways that house electrical and communication services. It is to provide a detail accent, to facilitate orientation with a diagonal striping extending up stairwell walls; this metal duct shall be provided with sound deadening insulation. > Long walls: shall be articulated by material or colour accents, textures, or patterns and by pre-located advertising signs. > Floors and walkways: (except tunnel floors) shall have patterns related to wall lines and level changes; > Ceilings: shall be similarly articulated, with the use of bulkheads, skylights, and accent luminaires, > Natural grade reference level: shall be enhanced by soft and hard landscaping including planter beds, flowering shrubs, patterned and coloured concrete, natural stone planter walls, etc.
Communications	<ul style="list-style-type: none"> > Signs/intercoms/CCTV: shall be pre-located and not superimposed: architectural components shall be coordinated with signs and equipment. Illumination and sight-lines shall be integrated with CCTV requirements; > Security devices/monitoring devices: shall be identified by signs as a deterrent: doors and windows to incorporate such signs or decals; > International symbols and colours: shall be used for barrier-free, pay telephone, high voltage and other signs where applicable. Signs shall be oriented and illuminated to suit sight-lines. See GO Signage Manual; and > Advertising signs: do serve to communicate a sense of place, but their location, especially when freestanding, must not conflict with directional signs or sight-lines. Consultants shall work with GO to pre-determine advertising sign locations and provide a concealed electrical supply system, to ensure no exposed conduits and no obstructed sight-lines.



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TAB 2: SITE INFRASTRUCTURE AND DEVELOPMENT Parking Infrastructure

- > Refer to GO “Station Electrical Room Standard” in the Design Requirements Manual for detailed guidelines.

COMMUNICATIONS/HUB ROOM

- > In Parking Structures, careful planning is required when locating the Communications and Hub Rooms. Attention must be paid to equipment placement within these rooms in relation to the structural ceiling elements. The required vertical clearance above the racks must also be taken into account. Ideally, cable trays shall be kept level, precast openings in structural “T’s” as determined by the structural engineer, to get to the side walls of the room.
- > Cable trays may be routed around structural ceiling elements if needed, however, shall not be installed lower than 2.0m A.F.F.
- > Unless otherwise requested, the racks shall be installed in the preferred configuration shown in the Information Technology Telecommunications & Systems Document (Appendix A of the DRM)
- > For detailed Communication/Hub room guidelines in Multilevel Parking Structures, refer to DRM TAB 7.

SERVICE & MAINTENANCE AREA – STORAGE/SERVICE ROOM

- > A designated storage area in the parking structure should be provided. The room(s) can be used to accommodate service equipment; sweeper storage and tools in a secure location.
- > The room(s) shall be accessed by a double leaf Hollow Metal (HM) door and the doors shall not open onto vehicular traffic; a concrete apron shall be provided with bollards to protect egress of service personnel onto the drive aisle.
- > Service rooms shall contain sprinklers, water valves, switches and mechanisms, etc.
- > Rooms that contain temperature sensitive equipment shall be insulated and shall require special design.

ELECTRICAL SERVICES AND DESIGN CRITERIA

- > Investigate impact of parking structure on the existing electrical service because the existing service may not accommodate the additional load. Refer to the DRM for detailed requirements.
- > Energy Management System/ Smart Panels should provide the most flexible control system available: multi-level lighting, occupancy lighting changes, light harvesting, programmable



CI-0501

TAB 5: RAIL AND BUS OPERATIONAL FACILITIES
 Bus Operational Facilities

ELECTRICAL

Feature	Design Requirements												
	<table border="1"> <tr> <td data-bbox="544 579 987 638">Interior repair garage, general</td> <td data-bbox="990 579 1430 638">500 lux</td> </tr> <tr> <td data-bbox="544 642 987 737">Interior repair garage, workbenches</td> <td data-bbox="990 642 1430 737">750 lux</td> </tr> <tr> <td data-bbox="544 741 987 800">Bus garage areas</td> <td data-bbox="990 741 1430 800">300 lux</td> </tr> <tr> <td data-bbox="544 804 987 863">Utility areas</td> <td data-bbox="990 804 1430 863">200 lux</td> </tr> <tr> <td data-bbox="544 867 987 926">Office areas</td> <td data-bbox="990 867 1430 926">200 lux</td> </tr> <tr> <td data-bbox="544 930 987 989">Emergency and night time lighting</td> <td data-bbox="990 930 1430 989">20 lux</td> </tr> </table>	Interior repair garage, general	500 lux	Interior repair garage, workbenches	750 lux	Bus garage areas	300 lux	Utility areas	200 lux	Office areas	200 lux	Emergency and night time lighting	20 lux
Interior repair garage, general	500 lux												
Interior repair garage, workbenches	750 lux												
Bus garage areas	300 lux												
Utility areas	200 lux												
Office areas	200 lux												
Emergency and night time lighting	20 lux												
Lighting Control	<ul style="list-style-type: none"> > Control interior lighting by local switches, occupancy sensors and the low voltage lighting control system. > Control exterior lighting by means of a photocell and contactor with a manual override; provide a computer based low voltage lighting control system to switch various lighting circuits through the building. 												
Receptacles	<ul style="list-style-type: none"> > All receptacles are to be duplex type spec grade to code use. > Receptacles are to be located in the following places: <ul style="list-style-type: none"> • Plant Areas, • Offices, • Control and Electrical Rooms, • On a dedicated circuit, at each workbench, • On the roof adjacent to each HVAC unit, • In wet and outdoor locations, • Distributed equally along the building perimeter; • Pendant cord mounter single receptacles in the repair 												



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TAB 7: TECHNICAL DISCIPLINES

Electrical

EXTERIOR LIGHTING ILLUMINATION LEVELS

Location	Illumination Level
Exterior Stairs & Walkways Separate from Buildings	20 Fc (200 LUX)
Pedestrian Paths and Bike ways	2 Fc (20 LUX)
Layover General lighting	2 Fc (20 LUX)
Wayside cabinet and Switch area	5 Fc (50 LUX)

- > Photocells and occupancy sensors are to be used.
- > The lighting levels for inside a covered Parking Facility shall be to a minimum recommended by IESNA and as follows:

LIGHTING LEVELS FOR INSIDE A COVERED PARKING FACILITY

Area	Specification	Colour Temperature
General parking and pedestrian areas	50 lux or 5fc	4000 K
Ramps and corners	110 lux or 10 fc	4000 K
Entrance areas	540 lux or 50 fc	4000 K
Service rooms	500 lux or 50 fc	4000 K
Stairways and elevator lobbies	220 lux or 20fc	4000 K

- > The lighting control shall be flexible i.e. programmable controlled per circuit complete with IP addressable and remote access and control.
- > The design shall consider methods of reducing energy usage and maintenance. LED Lighting shall be continuous dimmable (0 to 10 V DC). The design shall consider occupied and a 50 % reduction in light levels when unoccupied. Light harvesting systems shall also be considered.
- > The system shall be controlled by a Programmable Logic Controller which can handle multiple lighting levels and areas complete with unique on and off, a remote override, and a



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TAB 7: TECHNICAL DISCIPLINES

Electrical

changeable daylight savings time. The changes to the on and off configurations shall be done either remote or local computer connections.

- > Service areas like electrical rooms are to have ceiling mounted occupancy sensors on all light switches.
- > Exterior decorative, illuminated signage and perimeter lighting shall be all part of the design.
- > Pole lighting shall be to GO standards for lighting and poles details referenced in the DRM.
- > Reduction of light pollution of flood lights and wall washers (spill off into surrounding canopies) is to be considered.

Station locations with a high probability of vandalism shall have extra bright illumination, if required and viable in terms of adjacent neighbourhoods.

Uniformity Ratio

Maximum to minimum: 4:1 or better

Average to minimum: 3:1 or better.

Dimmable Illumination

Photocells, motion and occupancy sensors are to be used within multi-level parking structures, tunnels and pedestrian bridges.

Occupancy sensors are to be placed to allow no blind spots.

Refer to Illumination Levels table on page 478 – 479 TAB 7: ELECTRICAL for minimum lighting levels within multi-level parking structures, tunnels and pedestrian bridges as recommended by IESNA:

The lighting control shall be flexible i.e. programmable controlled per circuit complete with IP addressable and remote access and control.

Methods of reducing energy usage and maintenance shall be considered in design. LED Lighting shall be continuous dimmable (0 to 10 V DC). The design shall consider occupied and a 50 % reduction in light levels when unoccupied. Light harvesting systems shall also be considered.

LIGHT SOURCES AND CONTROLS

INTERIOR LIGHTING SOURCES AND CONTROLS

Location	Light Source	Control and Backup
Waiting	LED down lighting	Time-of-day controller, 100%



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TAB 7: TECHNICAL DISCIPLINES

Electrical

INTERIOR LIGHTING SOURCES AND CONTROLS

Location	Light Source	Control and Backup
	LED sconce lights	station open hours, 10% minimum station closed, 10% on Generator. Day light harvesting were possible.
Station Attendant	LED, continuous task lights over counters with parabolic lenses for glare-free illumination (no visible light source)	Local switches. One fixture UPS + Generator backed-up over sales counter, one over cash area and safe, or 10% minimum station closed
Staff Washroom	Mirror task light or surface mounted LED vandal resistant lenses	Occupancy sensor switch. One luminary on UPS + Generator
Public Washroom	LED, vandal resistant luminaries or valance or cove lights for large facilities	On/Off switch with occupancy sensor, one fixture on UPS + Generator
Electrical, Comms., Mechanical, Janitor, and Storage Rooms.	Linear LED 1219 mm long or surface mounted luminaries vandal resistant	On/Off switch with occupancy sensor, 50% on UPS + Generator in Mechanical, Electrical and Comms. Rooms only
Shop	Linear LED 2438 mm long, suspended. Task lights over equipment and workbenches to suit functions	Local switching or to suit particular application, 10% on UPS + Generator
Garage Maintenance Shop	LED for shops. LED Task lights where required	Panel or central switching to suit particular application. 10% on UPS + Generator or to Code requirements
Dispatch	LED, and supplementary illumination for maintenance with task lights to suit	Local switches, dimmers, 10% on UPS + Generator.
Office	Per IES	10% on UPS + Generator

EXTERIOR LIGHTING SOURCES AND CONTROLS

Location	Light Source	Control and Backup
Parking Lot, Passenger Drop-off and Pick-up Areas, and Bus Loop Areas including Bus Platforms and Access Roads	LED area lights or down lights on 6 or 12 m high galvanized steel poles or 30m high masts (use of LED on 30m high masts approved by GO Transit on a case by case basis). See Notes below.	Circuited for 30% in operation during station closed hours (photo-control only) and to have manual override of the photo control and time-clock (the manual override shall not be digital)



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TAB 7: TECHNICAL DISCIPLINES

Electrical

EXTERIOR LIGHTING SOURCES AND CONTROLS

Location	Light Source	Control and Backup
Parking Structure	LED	Day light harvesting and occupancy sensor control of two light levels and timer
Rail Platform	LED on 6 m hinged poles on 300 mm high concrete bases or in canopy. Urban platforms may require LED or Metal Halide luminaries if requested by the Municipality	Both timer and photo cell controlled, on Generator. During station closed hours 100% off. Override switch (snow removal use): 100% on
Mini-Platform	Same as Rail Platform	Controlled as part of Rail Platform
Tunnel, enclosed bridges and canopies	LED , 1219 mm long, c/w vandal resistant lenses, lights should be dimmable, when space not occupied	Breaker control, 30% on UPS + Generator
Internal Stairwell (tunnel, parking structure)	LED luminaries, semi-recessed in walls, below handrails	Breaker control, 30% on UPS + Generator
Exterior Stair and Walkway	Same as parking lot, Pole location to suit	Same as parking lot