
Part 1 General

1.1 RELATED REQUIREMENTS

- .1 National Building Code (NBC) 2010.
- .2 CAN/CSA B651-12 Accessible design for the built environment
- .3 CSA C22.1-12 Canadian electrical code
- .4 IE 16200-2013 (www.tpsgc-pwgsc.gc.ca)
- .5 Appendix E of the CAN/CSA B44-10 Code

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA MG1-[2011], Motors and Generators.
- .2 CSA International
 - .1 ASME A17.1/CSA B44-[2010], Safety Code for Elevators and Escalators (Bi-national Standard, with ASME A17.1.
 - .2 CSA B651-[12], Accessible Design for the Built Environment.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings:
 - .1 Convene pre-installation meeting [1] week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building construction subtrades.
 - .4 Review [manufacturer's] written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for passenger elevator and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the province of Quebec, Canada.
- .2 Indicate on drawings project layout, including details and information as follows:
 - .1 Size and location of machine and controller.
 - .2 Size and location of car, hoisting beam, guide rails, buffers stands and other components in hoistway.
 - .3 Rail bracket spacing and maximum loads on guide rails.
 - .4 Reactions at points of support.
 - .5 Weights of principal components.
 - .6 Top and bottom clearance and over travel of car.
 - .7 Wiring diagrams with location of circuit breaker, switchboard panel or disconnect switch, light switch and feeder extension points in machine room.
 - .8 Location in [hoistway] [machine room] for connection of travelling cables for [car light] [telephone].
 - .9 Location and size of access doors.
 - .10 Loads on hoisting beams.
 - .11 Expected heat generation of equipment in machine room.
 - .12 Seismic design data and detailed calculations.
 - .13 Include on general arrangement drawings:
 - .1 Type, size, location of hoistway entrances showing details of fastening to hoistway structure.
- .4 Samples:
 - .1 Submit duplicate 150 mm x 150 mm size samples, complete with colour schemes, for each as follows: floor material, car interior, car ceiling, car door, hoistway entrance door and frame finishes.
- .5 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .7 Manufacturer's Instructions: submit manufacturers installation instructions.
- .8 Manufacturer's Field Services: submit copies of manufacturer's field reports.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Project Record Documents:
 - .1 Record actual locations of equipment, names of equipment manufacturers and suppliers, concealed conduit and boxes, concealed devices, disconnects, communication systems and fire protection equipment and signals.

- .3 Operation and Maintenance Data: submit operation and maintenance data for passenger elevators for incorporation into manual.
 - .1 Include description of elevator system's method of operation and control including group supervisory control system, motor control system, door operation, signals, firefighter's service, and special or non-standard features provided.
 - .2 Provide parts catalogues with complete list of equipment replacement parts with equipment description and identifying numbers.
 - .3 Legible schematic wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.
 - .4 Instruct Departmental Representative in maintenance of special finishes.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer Qualifications: company or person experienced in performing work of this Section specializing in installation of work similar to that required for this project, approved by elevator systems manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect elevator components from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 WARRANTY

- .1 For Work of this Section 14 20 06 - Passenger Elevators 12 months warranty period prescribed in GC3.13 of General Conditions

1.9 NON-PROPRIETARY CONTROLS

- .1 Provide an elevator control and drive system that is Non-Proprietary.
- .2 The elevator control system shall not require any external Proprietary service tools for maintenance or adjustments.

- .3 The elevator control system shall be serviceable and maintainable by any qualified elevator maintenance provider capable of maintaining elevator equipment of similar design and complexity.

1.10 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 The elevators shall be installed according to the Canadian elevator code CAN/CSA B44-10 and all other applicable codes.
- .2 The elevators shall be constructed and installed according to the requirements of a level 2 seismic zone.
- .3 Elevator # 1 & 6 are MRL electric passenger elevators
 - .1 Traction machine will be located in the overhead portion of the hoistway
 - .1 Provide a traction type Overhead AC Permanent Magnet gearless machine with 2:1 roping arrangement. Machine to operate car speeds listed in section 1.2.
 - .2 Machine to consist of an AC motor matched to the drive, electromechanical brake and traction sheave mounted in proper alignment on a suitable bed-plate. Locate machine at top of the hoistway.
 - .3 Provide reversible AC motor with high starting current, specifically designed to meet the severe loads encountered in elevator service.
 - .4 Provide motor with a slip specification of 5% or less, or a NEMA rating of "A".
 - .5 Provide complete machine guarding.
 - .6 Mount the machine on sufficient rubber pads so as to reduce to a minimum, the transmission of noise and vibration of the machine to the building. Reduce noise and vibration to Owner's satisfaction.
 - .7 Suitably suspend car with wire ropes or Polyurethane-coated steel belts.
 - .2 Machine brake
 - .1 The brake assembly must stop the fully loaded cab travelling in the up direction with a deceleration force of less than 9.8 m/s².
 - .2 Adjust brake to hold car cab plus 125% of the rated load.
 - .3 After final adjustment of the brake and subsequent to the performance of safety tests and checks by the Inspecting Authorities, drill the brake

- spring nuts and rod and insert a cotter pin or seal to avoid incorrect or different adjustments in the future.
- .4 Arrange the brake to stop the elevator with full load in the car from full speed in the down direction within the normal stopping distance of the car.
- .5 Install a brake data plate near the brake assembly.
- .3 Car overspeed protection
 - .1 Provide means to prevent a car from over-speeding in the ascending direction of travel in accordance with clause 2.19 of the B44 Code. Include all materials and labour required, either for or as a result of the mounting and installation of the device.
 - .2 Detect any uncontrolled movement of the car prior to or, at a minimum, at the time when the car reaches a predetermined over speed, and cause the car to stop prior to the time when the counterweight strikes its buffers, or at least reduce the car speed to the speed for which the buffer is designed.
 - .3 Device to be capable of performing as required without assistance from any elevator component that solely, without built-on redundancy, controls the speed, or deceleration, or stops the car during normal operation.
 - .4 Locate the required safety devices in the elevator machine space. Provide all hardware and support beams required to fasten safety device in machine space. Use a fastenings and support design approved by a Professional Engineer registered to practice in the Province of Quebec.
 - .5 Design the safety device to be capable of setting and re-setting itself repeatedly without damaging itself or the elevator machine or ropes.
 - .6 The mechanism will be equipped with an electric actuator that will reset the overspeed switch to the ready run position.
 - .7 Provide governor rope to suit new governor.
- .4 Car safety
 - .1 Provide car safety that meet section 2.17 of the CAN/CSA B44-10 code.
 - .2 Perform full load over speed test.
- .5 Guide rails
 - .1 Provide standard "T" section guide rails for car and counterweight. Rail extremities shall be machined with tongue and grooved joints and substantial machined plates shall be used to form the joint between two (2) consecutive elements.
 - .2 Guide rails shall be erected perpendicularly parallel and plumb within maximum deviation of 3 mm on the total length of the rise. They shall be supported and placed so as not to become distorted by eccentric loading.
 - .3 Guide rails shall be securely attached to every floor by support brackets from the bottom of the pit to the underside of the overhead slab. Provide adjustable brackets in the pit.

- .4 Wall anchorage for guide rails support shall be provided by the elevator contractor.
- .5 Use metal shims only and provide lock-washers under nuts and tapped bolts.
- .6 Compensate for expansion and contraction of guide rails.
- .7 Use fish plates and guide rails with contact surfaces accurately machined to form smooth joints.
- .8 Include steel reinforcement (rail backing) when necessary.
- .9 Anchor guide rails in pit so as not to reduce the effectiveness of the waterproofing.
- .10 After final guide rail alignment, dowel or permanently weld rail brackets.
- .11 Remove and clean all protective coatings and rust from the guide rails and the machined surfaces to ensure smooth operation.
- .6 Suspension ropes and fastenings
 - .1 Provide Polyurethane Coated-Steel Belts or steel wire rope constructed for elevator service, for the suspension of the elevator car and counterweight.
 - .2 Ropes installed on any one elevator, shall be from the same factory production run.
 - .3 Provide wedge socket wire rope fastenings or approved fastening systems for flat belt suspension arrangements
 - .4 Provide individual compression springs at one end to equalize tension in ropes or belts.
 - .5 Provide two (2) retaining clips for wedge clamp type fastenings. Locate clips as per manufacturers' recommendations.
 - .6 Provide metal anti-rotation devices to secure all terminations after installation to prevent rotation of fastenings in hitch plates.
- .7 Variable voltage variable frequency drive.
 - .1 Provide a regenerative variable voltage variable frequency, flux vector drive control system.
 - .2 Provide closed loop tachometer feedback control. Continuously monitor the elevator speed signal from the velocity transducer and compare it with the intended speed signal to verify proper and safe operation of the elevator and to correct the actual speed to match the intended speed.
 - .3 Provide «stepless» acceleration and deceleration and smooth operation at all speeds. Drive to perform trouble-free within 10% of building supply voltage fluctuation.
 - .4 Include regenerative drive operation while machine is in an overhauling condition.
 - .5 Automatically re-start drive and control equipment which has stopped due to an AC power failure.
 - .6 The drive shall not create excessive audible noise in the elevator motor.
- .8 Controller and cabinet

- .1 Confirm location of elevator machine rooms on Architectural Drawings.
- .2 Enclose controllers in enamelled ventilated sheet cabinets. Provide hinged doors for easy access.
- .3 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
- .4 Provide electronic time delay devices which employ stable capacitors or crystals as time base.
- .5 Wiring on the controller, whether control or field wiring, must be done in neat, workman like order and all connections made to studs and terminals by means of wire lugs or similar connections.
- .6 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.
- .7 Isolate the inputs to micro-processors from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices.
- .8 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
- .9 Provide for separate regulated power supplies to serve the micro-processor system.
- .10 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.
- .11 Provide plated through holes for double sided boards.
- .12 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .13 "Patched" connections will not be accepted.
- .14 Design solid-state devices for a high level of noise immunity.
- .15 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.
- .16 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.
- .9 Emergency return unit
 - .1 Provide a battery powered system that will allow the car to return to the closest floor level depending on the car weight.
 - .2 The door opening device will be operable.
- .10 Simplex collective automatic control
 - .1 Provide a micro-processor based selective collective control system.
 - .2 Dispatch car to corresponding landing upon momentary pressure of car or hall call buttons.
 - .3 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for pre-set interval at landings where stops are made. Time delays to be adjustable from 0 to 15 seconds.

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- Cancel interval upon registration of car call or pressure on door close button.
 - .4 Stop car at landings for which car calls are registered. Make stops in order in which landings are reached, regardless of sequence in which buttons are registered.
 - .5 If no car buttons are registered and car starts UP in response to several DOWN calls, proceed to highest DOWN call and reverse to answer other DOWN calls. Similarly, when car starts DOWN in response to several UP calls proceed to lowest UP call, and reverse to answer other UP calls.
 - .6 If the car stops for a hall call and a car call is registered corresponding to the direction the car was travelling, proceed in same direction regardless of other registered landing calls.
 - .7 If DOWN hall calls are registered while car is travelling UP, do not stop for these calls but allow calls to remain registered.
 - .8 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
 - .9 When no hall or car calls have been registered for a period of sixty (60) seconds return elevator to the bottom landing and park with doors closed.
 - .11 Selector
 - .1 Provide a hoistway car position system, electrically coupled to the controller.
 - .2 Design system to provide the controller with precise information as to the absolute position of the elevator within the hoistway.
 - .3 Provide solid state devices, pulse generators, or magnetic switches, in combination with a fixed steel tape, for position and direction indication, speed reduction, levelling, door zone and related signals.
 - .4 Do not use electro-mechanical stepper switches.
 - .5 Design the unit so that the parts are readily accessible for replacement and adjustment.
 - .12 Car uncontrolled low speed protection
 - .1 Provide means to prevent any uncontrolled movement of the car in accordance with clause 2.19 of the B44 Code.
 - .2 Detect any uncontrolled movement of the car before the car travels away from the landing by more than 500 mm and bring the car to a full stop before it travels a maximum 1220 mm.
 - .3 Device to be capable of performing as required without assistance from any elevator component that solely, without built-on redundancy, controls the speed, or deceleration, or stops the car during normal operation within the levelling zone.
 - .13 Roller guides
 - .1 Provide spring loaded type car and counterweight roller guides.

- .2 Provide each guide with durable, oil resistant and resilient rubber tired ball bearing rollers to run on three finished rail surfaces.
- .3 Maintain each roller on its respective guide in uniform contact with rail surface at all time by means of substantial springs or by flexible mounting.
- .4 Provide guide operation, which is inaudible to passengers in the car or outside of the hoistway with the car operating at rated speed and car fan turned off.
- .5 Use roller tire material which will not develop flat spots after standing idle for 72 hours under average environmental conditions.
- .14 Buffers
 - .1 Provide buffers to suit car speed and capacity.
 - .2 Do not compress buffers when car is level with bottom floor.
 - .3 Provide where necessary all extension, reinforcement, support brackets, working platform and ladders to suit pit depth.
- .15 Stop switch
 - .1 Provide two (2) new locking type positive action stop switches in the pit. Locate one switch near top of ladder.
- .16 Pit Ladder
 - .1 Provide a pit ladder that meets the requirements CAN/CSA B44-10 code clause 2.2.4.2
- .17 Wiring, conduit and fittings
 - .1 Provide B44 Code approved insulated wiring.
 - .2 Install all wiring according to prevailing CEC Code requirements.
 - .3 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct.
 - .4 Provide and connect all hoistway wiring, travelling cables, car wiring, etc., and all remote alarm indicators or other similar items, from the device to terminal blocks mounted on the controller.
 - .5 Provide a separate junction box, mounted on the side of the controller in the machine room, with terminals for the connection of "non elevator" devices, such as telephones, card reader interface and connect from the elevator controller to this junction box, as required.
 - .6 Provide ten percent (15%) additional minimum spare wires.
 - .7 Connect all wires from one live device to another live device, (e.g. from car operating panel to controller) to car terminal blocks and controller terminal blocks.
 - .8 Check all wires, including spares, for continuity and grounds, and mark each wire by a number and each group as to destination.
 - .9 Mark all connections on intermediate terminal blocks with corresponding numbers.
 - .10 Where provided ensure all flexible conduit is aluminum type. Do not use armoured flexible metal conduit as a grounding conductor.

- .11 Mark all individual wires by numbered adhesive waterproof markers.
- .12 Limit the use of flexible conduit on car top to items that require movement or periodic adjustment.
- .13 Where electrical metallic tubing is used, provide steel compression type fittings. Fittings with set screws are not acceptable unless a separately identified grounding conductor is also installed inside the raceway.
- .14 Identify wires of multi-wire cables by colour code.
- .15 Label all terminal and junction boxes as to their function with permanently attached waterproof labels.
- .16 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
- .17 Provide stranded field wire with no splices.
- .18 Attach to the controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
- .19 Provide a supplementary, uninterrupted shielded cable running from machine room to the elevator, containing a sufficient number of shielded wires for eventual connection of security video camera. Terminate the wiring in a 20 x 20 box on the car top, permanently and legibly identified as camera wiring.
- .20 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.
- .21 All wiring that is run in conduit, tubing or troughing, must comply with Table 6 of the CEC Part.
- .22 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .23 Provide a separate identified ground wire to all switches and components connected by flexible conduit, such as, but not limited to, hoistway door locks, car gate switch, hall and car push buttons and limit switches.
- .24 All grounding or bonding conductors shall have a continuous outer finish that is green or green with one or more yellow stripes. Comply with TSSA Enforcement Procedure Bulletin Ref.No. 222/07 relating to proper grounding procedures.
- .25 The conductors from the controller to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian and Ontario Electrical Safety Codes. The wiring must be rated for 200° C. centigrade and be of the SF type or equivalent.
- .26 Neatly tie up or lace up and identify all spare wires in the controller.
- .18 Hoistway door sills
 - .1 Provide aluminum sills with anti-slip wearing surfaces to comply with ASTM B221-74 alloy 6351-T6.
 - .2 Provide continuous sill supports for the total width of the hoistway door opening at every floor.
 - .3 Conceal all sill fastenings.

- .19 Counterweight
 - .1 Provide a counterweight of structural or formed metal frame type with metal filler weights. Provide rods through weights and frame.
 - .2 Balance counterweight to equal the weight of the complete elevator car cab, frame and platform plus 40 to 42.5% of the contract load.
 - .3 Check runby and post sign in the vicinity of the counterweight buffer indicating the maximum designed runby for this installation.
 - .4 Statically balance the counterweight so that when the counterweight is at the centre of the hoistway it will hang in the centre of the rails with the top roller guides removed.
 - .5 Provide blocking under counterweight, where required.
- .20 Hoistway door frames
 - .1 Hoistway doors shall have at every landing a clear opening.
 - .2 Limit override opening and closing by cushioning through rubber bumpers and/or astragal.
 - .3 Door frames at all floors shall have a stainless steel finish.
 - .4 Door frames at all floors shall be of a standard model; either full and/or mini three piece frame adapted to the thickness of walls as indicated on the drawing.
- .21 Hoistway doors
 - .1 Construct doors of flush type steel sheets. Doors at all floors shall be of stainless steel finish.
 - .2 Hang doors with the closing mechanism released, to close regardless of their position on the track, when a 2.7 kg horizontal force is applied at mid height on the door in the horizontal motion.
 - .3 Reinforce doors to receive attachments and to withstand strains due to power operation.
 - .4 Entrances shall be 1.5 hr. fire rated in conformity with NBC, produced under label service program of ULC or other agency acceptable to authorities having jurisdiction.
 - .5 Comply with latest edition of the CAN4-S104 standard and affix ULC or other acceptable agency label on doors and accessories.
 - .6 Provide at top and bottom landings keyed hoistway access switches.
 - .7 Locate switch in hall door frame and engrave "Hoistway Access" with direction arrows on face plate. Include enable switch in service panel.
- .22 Hoistway door hangers, tracks, locks and closers
 - .1 Provide door hangers, tracks, and closers.
 - .2 Provide hoistway door locks; include ground wire back to controller.
 - .3 Provide heavy duty spirator or spring type closers.

- .4 Provide two (2) suspension hangers for each door panel rolling on appropriate tracks using rollers of not less than 82mm diameter, coat grooves with resilient flexible material.
- .5 Provide rollers with ball or roller sealed bearings designed to retain lubricant, equipped with cleaning and lubricating wiper to maintain rollers and track in clean condition. Provide two (2) door gibs.
- .6 Absorb upthrust with heavy duty type adjustable eccentric rollers equipped with ball or roller bearings.
Hoistway doors to be hung with the closing mechanism released, and shall start to close regardless of their position on the track, when a 2.7 kg horizontal force is applied at mid height on the door in a horizontal motion.
- .23 Hall buttons
 - .1 Provide one (1) riser of hall call buttons with integral illumination, incorporating blue LED type lights with a minimum 100,000 hour rating, complete with boxes. Buttons to be of same design as car buttons complete with Stainless Steel faceplates.
 - .2 Locate centreline of new buttons to be 1066mm above the floor.
 - .3 Illuminate call button when call is registered. Extinguish illumination when call has been answered.
 - .4 Provide at the designated level (ground floor), a flush mounted Stainless Steel fixture containing the Fire Recall key switch with appropriate indicator lights.
 - .1 The key switch shall be a three 3 position RESET- OFF- ON for the Fire Recall service. Provide quality type key switches of the Group 3 classification.
 - .5 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.
 - .6 Fasten all signal fixture face plates securely with unexposed fasteners or with tamper-proof fasteners.
- .24 Hall position and direction indicator
 - Provide above all hall doors, a digital hall position and direction indicator.
 - .1 Use BLUE LED type illumination, 100,000 hour rating, on a high resolution screen display.
 - .2 Display letters and numbers in segmented format at least 50 mm in height.
 - .3 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels.
 - .4 The lantern indicator shall consist of an LED digital display in the shape of an arrow. Use LED type, 100,000 hour rating, on a high resolution screen display.

- .5 Visual elements shall be a minimum of 60 mm in the smallest direction.
- .6 The lens for the Up direction shall be green in colour, and the lens for the Down direction shall be red in colour.
- .7 Arrange lanterns so that when the car stops in response to either a car call or a hall call, the in-car lantern, corresponding to the direction of travel, illuminates and the gong operates as the doors are opening.. Signal volume to be adjustable between 60 and 90 dBA.
- .8 Sound gong once for "UP" and twice for "DOWN" stops.
- .25 Design and construct elevator in accordance with CSA B651.
- .26 All signage and voice annunciation programs shall be bilingual. The use of international symbols is preferred.

2.2 SYSTEM DESCRIPTION

- .1 The elevators shall be installed according to the Canadian elevator code CAN/CSA B44-10 and all other applicable codes.
- .2 The elevators shall be constructed and installed according to the requirements of a level 2 seismic zone.
- .3 Elevator machine rooms shall be located on the architectural drawings.
- .4 Elevator # 2, 3 & 4 are hydraulic elevators.
 - .1 Hydraulic equipment
 - .1 Provide a complete and operational oil hydraulic elevator, with twin plungers and cylinders, pumping unit, storage tank, control valve, and muffler.
 - .2 Design the system for 2760 kPa (400 psi) maximum working pressure with cold oil.
 - .3 Arrange that the pump delivers oil directly into the cylinder at the necessary pressure and in sufficient quantity to force the plunger to lift the fully loaded car at the contract speed.
 - .4 Arrange equipment in the machine room to allow their removal, by dolly or other conventional means, without having to dismantle or remove any other major components.
 - .5 Provide any additional structural members required for the installation of the equipment, such as shelf angles or plunger support steel. Provide all required anchor bolts and beams, templates, inserts, and sleeves in the walls or floors.
 - .2 Power unit
 - .1 Provide a fully enclosed self-contained unit with structural steel base to support the storage tank, and with an integral oil-tight drip pan with drain. Mount the unit assembly on 25mm minimum vibration isolators.
 - .2 Provide a positive displacement pump of the direct drive submersible screw type, designed especially for oil-hydraulic elevator service,

- delivering a steady discharge with minimum pulsation. Design for mechanical efficiency of at least 85% under full rated load, with no more than 10% variation between no load and full load on the elevator.
- .3 Provide a master oil control valve unit assembly comprising:
- .1 Relief valve - externally adjustable, capable of bypassing the total oil flow without increasing back pressure more than 10% above that needed to barely open the valve.
 - .2 Check valve - designed to support the fully loaded elevator at rest on a column of oil, and to close quietly without allowing any perceptible reverse flow.
 - .3 Up-start valve - externally adjustable, and designed to bypass oil flow during initial start to relieve load on the motor; to close slowly and to provide for smooth UP-starts.
 - .4 Up-level valve - externally adjustable, and designed to assure smooth Up-stops through bypassing oil flow.
 - .5 Down valves - externally adjustable, and designed to control acceleration, lowering speed, down-levelling speed as well as stopping, so as to provide for smooth starts and stops in the down direction.
- .4 Manual valve - designed for manual lowering of the elevator car.
- .5 Shut-off valve - designed to isolate oil in the storage tank and permit adjusting the elevator without having to remove oil from the tank.
- .6 Strainers - of the self-cleaning type, and designed to prevent fouling the control valve system.
- .7 Construct the storage tank of welded sheet steel complete with a tight fitting cover, a protected vent, an oil level gauge, a drain and a filtering screen over the suction inlet. Provide for storage capacity equal to the volume needed to lift the elevator to the top landing, plus more than 90 litres reserve.
- .8 Provide blowout-proof mufflers in each oil line, designed to minimize hydraulic pulsations and to deliver quiet operation. Limit the increase of ambient noise in the cab to under 4dBA when the elevator travels either UP or DOWN anywhere in the hoistway.
- .9 Provide a mainline strainer of the self-cleaning type in each oil line, with a 60 mesh element and a magnetic drain plug.
- .10 Use supporting isolators for all piping in the machine room, hoistway and pit. Where piping penetrates a wall, provide resilient sleeves to prevent direct contact.
- .11 Provide hydraulic oil with a minimum flash point of 204 ° C and viscosity of approximately 30 seconds at 37.5° C.
- .12 Provide a permanent hoisting beam or hook above tank to facilitate the removal of the pump or motor.
- .3 Oil line

- .1 The oil line shall be of schedule 40 and respect the requirements of ATSM A 106 or ATSM A 53 type E or S.
- .2 The oil line shall be fastened accordingly to following chart:

Diameter in inches	Maximum spacing in inches
1.0	60
1.5	90
2.0	102
2.5	108
3.0	120
4.0	128

- .3 Limit the use of 90° couplings in the oil line where possible. Use 45° couplings where ever possible. Extensive use of 90° couplings will be rejected.
- .4 Cylinder and piston
 - .1 Provide plungers of seamless steel tubing or pipe, with a fine polished finish, securely joined with internal threaded couplings. Design sections to accommodate access into building. Provide a stop-ring to prevent the plunger from leaving the cylinder. Followers will not be accepted.
 - .2 Secure the plunger to the car frame with vibration damping platens.
 - .3 Construct the cylinder of seamless steel piping sufficiently thick to withstand a test pressure equal to the maximum working pressure. Connect the cylinder with substantial external couplings. Provide a safety bulkhead, in addition to a welded closure at the bottom.
 - .4 Weld the cylinder head to the cylinder, and provide an adjustable packing gland so arranged as to effectively prevent oil leakage around the plunger. Provide means to collect oil at the cylinder head and return surplus oil to the tank reservoir.
 - .5 Provide a shut-off valve in the pit and in the machine room designed to isolate the oil in the line and permit changing of the packing gland without draining the line.
- .5 Guide rails
 - .1 Provide standard "T" section guide rails for car.. Rail extremities shall be machined with tongue and grooved joints and substantial machined plates shall be used to form the joint between two (2) consecutive elements.

- .2 Guide rails shall be erected perpendicularly parallel and plumb within maximum deviation of 3 mm on the total length of the rise. They shall be supported and placed so as not to become distorted by eccentric loading.
- .3 Guide rails shall be securely attached to every floor by support brackets from the bottom of the pit to the underside of the overhead slab. Provide adjustable brackets in the pit.
- .4 Wall anchorage for guide rails support shall be provided by the elevator contractor.
- .5 Use metal shims only and provide lock-washers under nuts and tapped bolts.
- .6 Compensate for expansion and contraction of guide rails.
- .7 Use fish plates and guide rails with contact surfaces accurately machined to form smooth joints.
- .8 Include steel reinforcement (rail backing) when necessary.
- .9 Anchor guide rails in pit so as not to reduce the effectiveness of the waterproofing.
- .10 After final guide rail alignment, dowel rail brackets.
- .11 Remove and clean all protective coatings and rust from the guide rails and the machined surfaces to ensure smooth operation.
- .6 Controller and cabinet
 - .1 Confirm location of elevator machine rooms on Architectural Drawings.
 - .2 Enclose controllers in enamelled ventilated sheet cabinets. Provide hinged doors for easy access.
 - .3 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
 - .4 Provide electronic time delay devices which employ stable capacitors or crystals as time base.
 - .5 Wiring on the controller, whether control or field wiring, must be done in neat, workman like order and all connections made to studs and terminals by means of wire lugs or similar connections.
 - .6 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.
 - .7 Isolate the inputs to micro-processors from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices.
 - .8 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
 - .9 Provide for separate regulated power supplies to serve the micro-processor system.
 - .10 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.
 - .11 Provide plated through holes for double sided boards.

- .12 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .13 "Patched" connections will not be accepted.
- .14 Design solid-state devices for a high level of noise immunity.
- .15 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.
- .16 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.
- .7 Emergency return unit
 - .1 Provide a battery powered system that will allow the car to return to the closest floor level depending on the car weight.
 - .2 The door opening device will be operable.
- .8 Simplex collective automatic control
 - .1 Provide a micro-processor based selective collective control system.
 - .2 Dispatch car to corresponding landing upon momentary pressure of car or hall call buttons.
 - .3 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for pre-set interval at landings where stops are made. Time delays to be adjustable from 0 to 15 seconds. Cancel interval upon registration of car call or pressure on door close button.
 - .4 Stop car at landings for which car calls are registered. Make stops in order in which landings are reached, regardless of sequence in which buttons are registered.
 - .5 If no car buttons are registered and car starts UP in response to several DOWN calls, proceed to highest DOWN call and reverse to answer other DOWN calls. Similarly, when car starts DOWN in response to several UP calls proceed to lowest UP call, and reverse to answer other UP calls.
 - .6 If the car stops for a hall call and a car call is registered corresponding to the direction the car was travelling, proceed in same direction regardless of other registered landing calls.
 - .7 If DOWN hall calls are registered while car is travelling UP, do not stop for these calls but allow calls to remain registered.
 - .8 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
 - .9 When no hall or car calls have been registered for a period of sixty (60) seconds return elevator to the bottom landing and park with doors closed.
- .9 Selector
 - .1 Provide a hoistway car position system, electrically coupled to the controller.
 - .2 Design system to provide the controller with precise information as to the absolute position of the elevator within the hoistway.

- .3 Provide solid state devices, pulse generators, or magnetic switches, in combination with a fixed steel tape, for position and direction indication, speed reduction, levelling, door zone and related signals.
- .4 Do not use electro-mechanical stepper switches.
- .5 Design the unit so that the parts are readily accessible for replacement and adjustment.
- .10 Guide rails
 - .1 Provide standard "T" section guide rails for car.. Rail extremities shall be machined with tongue and grooved joints and substantial machined plates shall be used to form the joint between two (2) consecutive elements.
 - .2 Guide rails shall be erected perpendicularly parallel and plumb within maximum deviation of 3 mm on the total length of the rise. They shall be supported and placed so as not to become distorted by eccentric loading.
 - .3 Guide rails shall be securely attached to every floor by support brackets from the bottom of the pit to the underside of the overhead slab. Provide adjustable brackets in the pit.
 - .4 Wall anchorage for guide rails support shall be provided by the elevator contractor.
 - .5 Use metal shims only and provide lock-washers under nuts and tapped bolts.
 - .6 Compensate for expansion and contraction of guide rails.
 - .7 Use fish plates and guide rails with contact surfaces accurately machined to form smooth joints.
 - .8 Include steel reinforcement (rail backing) when necessary.
 - .9 Anchor guide rails in pit so as not to reduce the effectiveness of the waterproofing.
 - .10 After final guide rail alignment, dowel rail brackets.
 - .11 Remove and clean all protective coatings and rust from the guide rails and the machined surfaces to ensure smooth operation.
- .11 Buffers
 - .1 Provide buffers to suit car speed and capacity.
 - .2 Do not compress buffers when car is level with bottom floor.
 - .3 Provide where necessary all extension, reinforcement, support brackets, working platform and ladders to suit pit depth.
- .12 Stop switch
 - .1 Provide two (2) new locking type positive action stop switches in the pit. Locate one switch near top of ladder.
- .13 Pit Ladder
 - .1 Provide a pit ladder that meets the requirements CAN/CSA B44-10 code clause 2.2.4.2

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- .14 Wiring, conduit and fittings
- .1 Provide B44 Code approved insulated wiring.
 - .2 Install all wiring according to prevailing CEC Code requirements.
 - .3 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct.
 - .4 Provide and connect all hoistway wiring, travelling cables, car wiring, etc., and all remote alarm indicators or other similar items, from the device to terminal blocks mounted on the controller.
 - .5 Provide a separate junction box, mounted on the side of the controller in the machine room, with terminals for the connection of "non elevator" devices, such as telephones, card reader interface and connect from the elevator controller to this junction box, as required.
 - .6 Provide ten percent (15%) additional minimum spare wires.
 - .7 Connect all wires from one live device to another live device, (e.g. from car operating panel to controller) to car terminal blocks and controller terminal blocks.
 - .8 Check all wires, including spares, for continuity and grounds, and mark each wire by a number and each group as to destination.
 - .9 Mark all connections on intermediate terminal blocks with corresponding numbers.
 - .10 Where provided ensure all flexible conduit is aluminum type. Do not use armoured flexible metal conduit as a grounding conductor.
 - .11 Mark all individual wires by numbered adhesive waterproof markers.
 - .12 Limit the use of flexible conduit on car top to items that require movement or periodic adjustment.
 - .13 Where electrical metallic tubing is used, provide steel compression type fittings. Fittings with set screws are not acceptable unless a separately identified grounding conductor is also installed inside the raceway.
 - .14 Identify wires of multi-wire cables by colour code.
 - .15 Label all terminal and junction boxes as to their function with permanently attached waterproof labels.
 - .16 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
 - .17 Provide stranded field wire with no splices.
 - .18 Attach to the controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
 - .19 Provide a supplementary, uninterrupted shielded cable running from machine room to the elevator, containing a sufficient number of shielded wires for eventual connection of security video camera. Terminate the wiring in a 20 x 20 box on the car top, permanently and legibly identified as camera wiring.
 - .20 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.

- .21 All wiring that is run in conduit, tubing or troughing, must comply with Table 6 of the CEC Part.
- .22 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .23 Provide a separate identified ground wire to all switches and components connected by flexible conduit, such as, but not limited to, hoistway door locks, car gate switch, hall and car push buttons and limit switches.
- .24 All grounding or bonding conductors shall have a continuous outer finish that is green or green with one or more yellow stripes. Comply with TSSA Enforcement Procedure Bulletin Ref.No. 222/07 relating to proper grounding procedures.
- .25 The conductors from the controller to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian and Ontario Electrical Safety Codes. The wiring must be rated for 200° C. centigrade and be of the SF type or equivalent.
- .26 Neatly tie up or lace up and identify all spare wires in the controller.
- .15 Hoistway door sills
 - .1 Provide aluminum sills with anti-slip wearing surfaces to comply with ASTM B221-74 alloy 6351-T6.
 - .2 Provide continuous sill supports for the total width of the hoistway door opening at every floor.
 - .3 Conceal all sill fastenings.
- .16 Hoistway door frames
 - .1 Hoistway doors shall have at every landing a clear opening.
 - .2 Limit override opening and closing by cushioning through rubber bumpers and/or astragal.
 - .3 Door frames at all floors shall have a stainless steel finish.
 - .4 Door frames at all floors shall be of a standard model; either full and/or mini three piece frame adapted to the thickness of walls as indicated on the drawing.
- .17 Hoistway doors
 - .1 Construct doors of flush type steel sheets. Doors at all floors shall be of stainless steel finish.
 - .2 Hang doors with the closing mechanism released, to close regardless of their position on the track, when a 2.7 kg horizontal force is applied at mid height on the door in the horizontal motion.
 - .3 Reinforce doors to receive attachments and to withstand strains due to power operation.
 - .4 Entrances shall be 1.5 hr. fire rated in conformity with NBC, produced under label service program of ULC or other agency acceptable to authorities having jurisdiction.

- .5 Comply with latest edition of the CAN4-S104 standard and affix ULC or other acceptable agency label on doors and accessories.
 - .6 Provide at top and bottom landings keyed hoistway access switches.
 - .7 Locate switch in hall door frame and engrave "Hoistway Access" with direction arrows on face plate. Include enable switch in service panel.
- .18 Hoistway door hangers, tracks, locks and closers
- .1 Provide door hangers, tracks, and closers.
 - .2 Provide hoistway door locks; include ground wire back to controller.
 - .3 Provide heavy duty spirator or spring type closers.
 - .4 Provide two (2) suspension hangers for each door panel rolling on appropriate tracks using rollers of not less than 82mm diameter, coat grooves with resilient flexible material.
 - .5 Provide rollers with ball or roller sealed bearings designed to retain lubricant, equipped with cleaning and lubricating wiper to maintain rollers and track in clean condition. Provide two (2) door gibs.
 - .6 Absorb upthrust with heavy duty type adjustable eccentric rollers equipped with ball or roller bearings.
Hoistway doors to be hung with the closing mechanism released, and shall start to close regardless of their position on the track, when a 2.7 kg horizontal force is applied at mid height on the door in a horizontal motion.
- .19 Hall buttons
- .1 Provide one (1) riser of hall call buttons with integral illumination, incorporating blue LED type lights with a minimum 100,000 hour rating, complete with boxes. Buttons to be of same design as car buttons complete with Stainless Steel faceplates.
 - .2 Locate centreline of new buttons to be 1066mm above the floor.
 - .3 Illuminate call button when call is registered. Extinguish illumination when call has been answered.
 - .4 Provide at the designated level (ground floor), a flush mounted Stainless Steel fixture containing the Fire Recall key switch with appropriate indicator lights.
 - .1 The key switch shall be a three 3 position RESET- OFF- ON for the Fire Recall service. Provide quality type key switches of the Group 3 classification.
 - .5 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.
 - .6 Fasten all signal fixture face plates securely with unexposed fasteners or with tamper-proof fasteners.
- .20 Hall position and direction indicator
- Provide above all hall doors, a digital hall position and direction indicator.

- .1 Use BLUE LED type illumination, 100,000 hour rating, on a high resolution screen display.
- .2 Display letters and numbers in segmented format at least 50 mm in height.
- .3 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels.
- .4 The lantern indicator shall consist of an LED digital display in the shape of an arrow. Use LED type, 100,000 hour rating, on a high resolution screen display.
- .5 Visual elements shall be a minimum of 60 mm in the smallest direction.
- .6 The lens for the Up direction shall be green in colour, and the lens for the Down direction shall be red in colour.
- .7 Arrange lanterns so that when the car stops in response to either a car call or a hall call, the in-car lantern, corresponding to the direction of travel, illuminates and the gong operates as the doors are opening.. Signal volume to be adjustable between 60 and 90 dBA.
- .8 Sound gong once for "UP" and twice for "DOWN" stops.
- .21 Design and construct elevator in accordance with CSA B651.
- .22 All signage and voice annunciation programs shall be bilingual. The use of international symbols is preferred.

2.3 SYSTEM DESCRIPTION

- .1 The elevators shall be installed according to the Canadian elevator code CAN/CSA B44-10 and all other applicable codes.
- .2 The elevators shall be constructed and installed according to the requirements of a level 2 seismic zone.
- .3 Elevator machine rooms shall be located on the architectural drawings.
- .4 Elevator # 5 is a limited use / limited –application elevator as defined in the CAN/CSA B44-10 code.
 - .1 Hydraulic equipment
 - .1 Provide a complete and operational oil hydraulic elevator, with twin plungers and cylinders, pumping unit, storage tank, control valve, and muffler.
 - .2 Arrange that the pump delivers oil directly into the cylinder at the necessary pressure and in sufficient quantity to force the plunger to lift the fully loaded car at the contract speed.
 - .2 Power unit
 - .1 Provide a fully enclosed self-contained unit with structural steel base to support the storage tank, and with an integral oil-tight drip pan with drain. Mount the unit assembly on 25mm minimum vibration isolators.
 - .2 Provide a positive displacement pump of the direct drive submersible screw type, designed especially for oil-hydraulic elevator service,

delivering a steady discharge with minimum pulsation. Design for mechanical efficiency of at least 85% under full rated load, with no more than 10% variation between no load and full load on the elevator.

- .3 Provide a master oil control valve unit assembly comprising:
 - .1 Relief valve - externally adjustable, capable of bypassing the total oil flow without increasing back pressure more than 10% above that needed to barely open the valve.
 - .2 Check valve - designed to support the fully loaded elevator at rest on a column of oil, and to close quietly without allowing any perceptible reverse flow.
 - .3 Up-start valve - externally adjustable, and designed to bypass oil flow during initial start to relieve load on the motor; to close slowly and to provide for smooth UP-starts.
 - .4 Up-level valve - externally adjustable, and designed to assure smooth Up-stops through bypassing oil flow.
 - .5 Down valves - externally adjustable, and designed to control acceleration, lowering speed, down-levelling speed as well as stopping, so as to provide for smooth starts and stops in the down direction.
- .4 Manual valve - designed for manual lowering of the elevator car.
- .5 Shut-off valve - designed to isolate oil in the storage tank and permit adjusting the elevator without having to remove oil from the tank.
- .6 Strainers - of the self-cleaning type, and designed to prevent fouling the control valve system.
- .7 Construct the storage tank of welded sheet steel complete with a tight fitting cover, a protected vent, an oil level gauge, a drain and a filtering screen over the suction inlet. Provide for storage capacity equal to the volume needed to lift the elevator to the top landing, plus a 20% reserve.
- .8 Provide a mainline strainer of the self-cleaning type in each oil line, with a 60 mesh element and a magnetic drain plug.
- .9 Use supporting isolators for all piping in the machine room, hoistway and pit. Where piping penetrates a wall, provide resilient sleeves to prevent direct contact.
- .10 Provide hydraulic oil with a minimum flash point of 204 ° C and viscosity of approximately 30 seconds at 37.5° C.

.3 Oil line

- .1 The oil line shall be of schedule 40 and respect the requirements of ATSM A 106 or ATSM A 53 type E or S.
- .2 The oil line shall be fastened accordingly to following chart:

Diameter in inches	Maximum spacing in inches
1.0	60
1.5	90
2.0	102
2.5	108
3.0	120
4.0	128

- .3 Limit the use of 90° couplings in the oil line where possible. Use 45° couplings where ever possible. Extensive use of 90° couplings will be rejected.
- .4 Cylinder and piston
 - .1 Provide plungers of seamless steel tubing or pipe, with a fine polished finish, securely joined with internal threaded couplings. Design sections to accommodate access into building. Provide a stop-ring to prevent the plunger from leaving the cylinder. Followers will not be accepted.
 - .2 Secure the plunger to the car frame with vibration damping platens.
 - .3 Construct the cylinder of seamless steel piping sufficiently thick to withstand a test pressure equal to the maximum working pressure. Connect the cylinder with substantial external couplings. Provide a safety bulkhead, in addition to a welded closure at the bottom.
 - .4 Weld the cylinder head to the cylinder, and provide an adjustable packing gland so arranged as to effectively prevent oil leakage around the plunger. Provide means to collect oil at the cylinder head and return surplus oil to the tank reservoir.
 - .5 Provide a shut-off valve in the pit and in the machine room designed to isolate the oil in the line and permit changing of the packing gland without draining the line.
- .5 Car overspeed protection
 - .1 Provide means to prevent a car from over-speeding in the ascending direction of travel in accordance with clause 2.19 of the B44 Code. Include all materials and labour required, either for or as a result of the mounting and installation of the device.

- .2 Detect any uncontrolled movement of the car prior to or, at a minimum, at the time when the car reaches a predetermined over speed, and cause the car to stop prior to the time when the counterweight strikes its buffers, or at least reduce the car speed to the speed for which the buffer is designed.
- .3 Device to be capable of performing as required without assistance from any elevator component that solely, without built-on redundancy, controls the speed, or deceleration, or stops the car during normal operation.
- .4 Locate the required safety devices in the elevator machine space. Provide all hardware and support beams required to fasten safety device in machine space. Use a fastenings and support design approved by a Professional Engineer registered to practice in the Province of Quebec.
- .5 Design the safety device to be capable of setting and re-setting itself repeatedly without damaging itself or the elevator machine or ropes.
- .6 The mechanism will be equipped with an electric actuator that will reset the overspeed switch to the ready run position.
- .7 Provide governor rope to suit new governor.
- .6 Car safety
 - .1 Provide car safety that meet section 2.17 of the CAN/CSA B44-10 code.
 - .2 Perform full load over speed test.
- .7 Suspension ropes and fastenings
 - .1 Provide steel wire rope constructed for elevator service, for the suspension of the elevator.
 - .2 Ropes installed on any one elevator, shall be from the same factory production run.
 - .3 Provide wedge socket wire rope fastenings or approved fastening.
 - .4 Provide individual compression springs at one end to equalize tension in ropes.
 - .5 Provide two (2) retaining clips for wedge clamp type fastenings. Locate clips as per manufacturers' recommendations.
- .8 Controller and cabinet
 - .1 Confirm location of elevator machine rooms on Architectural Drawings.
 - .2 Enclose controllers in enamelled ventilated sheet cabinets. Provide hinged doors for easy access.
 - .3 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
 - .4 Provide electronic time delay devices which employ stable capacitors or crystals as time base.
 - .5 Wiring on the controller, whether control or field wiring, must be done in neat, workman like order and all connections made to studs and terminals by means of wire lugs or similar connections.

- .6 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.
- .7 Isolate the inputs to micro-processors from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices.
- .8 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
- .9 Provide for separate regulated power supplies to serve the micro-processor system.
- .10 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.
- .11 Provide plated through holes for double sided boards.
- .12 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .13 "Patched" connections will not be accepted.
- .14 Design solid-state devices for a high level of noise immunity.
- .15 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.
- .16 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.
- .9 Emergency return unit
 - .1 Provide a battery powered system that will allow the car to return to the lowest level.
 - .2 The door opening device will be operable.
- .10 Selector
 - .1 Provide a hoistway car position system, electrically coupled to the controller.
 - .2 Design system to provide the controller with precise information as to the absolute position of the elevator within the hoistway.
 - .3 Provide solid state devices, pulse generators, or magnetic switches, in combination with a fixed steel tape, for position and direction indication, speed reduction, levelling, door zone and related signals.
 - .4 Do not use electro-mechanical stepper switches.
 - .5 Design the unit so that the parts are readily accessible for replacement and adjustment.
- .11 Guide rails
 - .1 Provide standard "T" section guide rails for car.. Rail extremities shall be machined with tongue and grooved joints and substantial machined plates shall be used to form the joint between two (2) consecutive elements.

- .2 Guide rails shall be erected perpendicularly parallel and plumb within maximum deviation of 3 mm on the total length of the rise. They shall be supported and placed so as not to become distorted by eccentric loading.
- .3 Guide rails shall be securely attached to every floor by support brackets from the bottom of the pit to the underside of the overhead slab. Provide adjustable brackets in the pit.
- .4 Wall anchorage for guide rails support shall be provided by the elevator contractor.
- .5 Use metal shims only and provide lock-washers under nuts and tapped bolts.
- .6 Compensate for expansion and contraction of guide rails.
- .7 Use fish plates and guide rails with contact surfaces accurately machined to form smooth joints.
- .8 Include steel reinforcement (rail backing) when necessary.
- .9 Anchor guide rails in pit so as not to reduce the effectiveness of the waterproofing.
- .10 After final guide rail alignment, dowel rail brackets.
- .11 Remove and clean all protective coatings and rust from the guide rails and the machined surfaces to ensure smooth operation.
- .12 Buffers
 - .1 Provide buffers to suit car speed and capacity.
- .13 Stop switch
 - .1 Provide one (1) new locking type positive action stop switches in the pit.
- .14 Wiring, conduit and fittings
 - .1 Provide B44 Code approved insulated wiring.
 - .2 Install all wiring according to prevailing CEC Code requirements.
 - .3 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct.
 - .4 Provide and connect all hoistway wiring, travelling cables, car wiring, etc., and all remote alarm indicators or other similar items, from the device to terminal blocks mounted on the controller.
 - .5 Provide a separate junction box, mounted on the side of the controller in the machine room, with terminals for the connection of "non elevator" devices, such as telephones, card reader interface and connect from the elevator controller to this junction box, as required.
 - .6 Provide ten percent (15%) additional minimum spare wires.
 - .7 Connect all wires from one live device to another live device, (e.g. from car operating panel to controller) to car terminal blocks and controller terminal blocks.
 - .8 Check all wires, including spares, for continuity and grounds, and mark each wire by a number and each group as to destination.

- .9 Mark all connections on intermediate terminal blocks with corresponding numbers.
- .10 Where provided ensure all flexible conduit is aluminum type. Do not use armoured flexible metal conduit as a grounding conductor.
- .11 Mark all individual wires by numbered adhesive waterproof markers.
- .12 Limit the use of flexible conduit on car top to items that require movement or periodic adjustment.
- .13 Where electrical metallic tubing is used, provide steel compression type fittings. Fittings with set screws are not acceptable unless a separately identified grounding conductor is also installed inside the raceway.
- .14 Identify wires of multi-wire cables by colour code.
- .15 Label all terminal and junction boxes as to their function with permanently attached waterproof labels.
- .16 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
- .17 Provide stranded field wire with no splices.
- .18 Attach to the controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
- .19 Provide a supplementary, uninterrupted shielded cable running from machine room to the elevator, containing a sufficient number of shielded wires for eventual connection of security video camera. Terminate the wiring in a 20 x 20 box on the car top, permanently and legibly identified as camera wiring.
- .20 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.
- .21 All wiring that is run in conduit, tubing or troughing, must comply with Table 6 of the CEC Part.
- .22 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .23 Provide a separate identified ground wire to all switches and components connected by flexible conduit, such as, but not limited to, hoistway door locks, car gate switch, hall and car push buttons and limit switches.
- .24 All grounding or bonding conductors shall have a continuous outer finish that is green or green with one or more yellow stripes. Comply with TSSA Enforcement Procedure Bulletin Ref.No. 222/07 relating to proper grounding procedures.
- .25 The conductors from the controller to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian and Ontario Electrical Safety Codes. The wiring must be rated for 200° C. centigrade and be of the SF type or equivalent.
- .26 Neatly tie up or lace up and identify all spare wires in the controller.
- .15 Hoistway door sills

- .1 Provide aluminum sills with anti-slip wearing surfaces to comply with ASTM B221-74 alloy 6351-T6.
- .2 Provide continuous sill supports for the total width of the hoistway door opening at every floor.
- .3 Conceal all sill fastenings.
- .16 Hoistway door frames
 - .1 Hoistway doors shall have at every landing a clear opening.
 - .2 Limit override opening and closing by cushioning through rubber bumpers and/or astragal.
 - .3 Door frames at all floors shall have a stainless steel finish.
 - .4 Door frames at all floors shall be of a standard model; either full and/or mini three piece frame adapted to the thickness of walls as indicated on the drawing.
- .17 Hoistway doors
 - .1 Construct doors of flush type steel sheets. Doors at all floors shall be of stainless steel finish.
 - .2 Hang doors with the closing mechanism released, to close regardless of their position on the track, when a 2.7 kg horizontal force is applied at mid height on the door in the horizontal motion.
 - .3 Reinforce doors to receive attachments and to withstand strains due to power operation.
 - .4 Entrances shall be 1.5 hr. fire rated in conformity with NBC, produced under label service program of ULC or other agency acceptable to authorities having jurisdiction.
 - .5 Comply with latest edition of the CAN4-S104 standard and affix ULC or other acceptable agency label on doors and accessories.
 - .6 Provide at top and bottom landings keyed hoistway access switches.
 - .7 Locate switch in hall door frame and engrave "Hoistway Access" with direction arrows on face plate. Include enable switch in service panel.
- .18 Hoistway door hangers, tracks, locks and closers
 - .1 Provide door hangers, tracks, and closers.
 - .2 Provide hoistway door locks; include ground wire back to controller.
 - .3 Provide heavy duty spirator or spring type closers.
 - .4 Provide two (2) suspension hangers for each door panel rolling on appropriate tracks using rollers of not less than 82mm diameter, coat grooves with resilient flexible material.
 - .5 Provide rollers with ball or roller sealed bearings designed to retain lubricant, equipped with cleaning and lubricating wiper to maintain rollers and track in clean condition. Provide two (2) door gibs.
 - .6 Absorb upthrust with heavy duty type adjustable eccentric rollers equipped with ball or roller bearings.
Hoistway doors to be hung with the closing mechanism released, and shall start to close regardless of their position on the track, when a 2.7 kg

horizontal force is applied at mid height on the door in a horizontal motion.

- .19 Hall buttons
 - .1 Provide one (1) riser of hall call buttons with integral illumination, incorporating blue LED type lights with a minimum 100,000 hour rating, complete with boxes. Buttons to be of same design as car buttons complete with Stainless Steel faceplates.
 - .2 Locate centreline of new buttons to be 1066mm above the floor.
 - .3 Illuminate call button when call is registered. Extinguish illumination when call has been answered.
 - .4 Provide at the designated level (ground floor), a flush mounted Stainless Steel fixture containing the Fire Recall key switch with appropriate indicator lights.
 - .1 The key switch shall be a three 3 position RESET- OFF- ON for the Fire Recall service. Provide quality type key switches of the Group 3 classification.
 - .5 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.
 - .6 Fasten all signal fixture face plates securely with unexposed fasteners or with tamper-proof fasteners.
- .20 Design and construct elevator in accordance with CSA B651.
- .21 All signage and voice annunciation programs shall be bilingual. The use of international symbols is preferred.

2.4 PERFORMANCE REQUIREMENTS

- .1 Select and install the electric traction & hydraulic passenger elevator components to form a complete and operating elevator system meeting the following performance characteristics:
- .2 Elevator # 1
 - .1 Service: general usage
 - .2 Installation: one MRL simplex electric passenger elevator
 - .3 Operation : simplex collective
 - .4 Elevator cabs : one (1) cab;
 - .5 Cab interior dimensions : 2032 mm X 1651mm.
 - .6 Capacity: 1588 kg.
 - .7 Speed : 0.75 m/s.
 - .8 Rise : 15.5 m.
 - .9 Overhead : 4255 mm.
 - .10 Pit:1524 mm.
 - .11 Stops : 5.
 - .12 Floors : 5 front openings (B, G, 2, 3 & 4).
 - .13 Hoistway dimensions: 2896 mm de largeur x 2134 mm de profondeur.

- .14 Hoistway door dimensions : 1067 mm largeur par 2134 mm hauteur.
- .15 Car door speed: one speed center opening
- .16 Hall door type : one speed center opening
- .3 Elevator # 2
 - .1 Usage: general usage
 - .2 Type of elevator : holeless hydraulic
 - .3 Operation : simplex collective
 - .4 Car : one (1)
 - .5 Cab dimensions : 2032 mm X 1295 mm.
 - .6 Capacity: 1134 kg.
 - .7 Speed : 0.50 m/s.
 - .8 Travel : 2.435 m.
 - .9 Overhead : 4267 mm.
 - .10 Pit : 1220 mm.
 - .11 Number of stops : 2.
 - .12 Floor openings : 2 front. (B & G).
 - .13 Hoistway inside dimensions: 2590 mm width x 1778 mm depth.
 - .14 Hoistway door openings : 1067 mm width par 1981 mm height.
 - .15 Car door speed: single speed side slide
 - .16 Hoistway door : single speed side slide
- .4 Elevator # 3
 - .1 Service: passenger / service elevator. Shall be designed to carry freight as per clause 2.16.1.3. Class A loading, as per clause 2.16.2.2.1 of the CAN/CSA B44-10.
 - .2 Installation : hydraulic holeless system
 - .3 Operation : simplex microprocessor based
 - .4 Number of cabs : one (1)
 - .5 Car Inside dimensions : 1626 mm X 2413 mm.
 - .6 Capacity : 1814 kg.
 - .7 Speed : 0.76 m/s.
 - .8 Rise : 3.5 m.
 - .9 Overhead : 4435 mm.
 - .10 Pit : 1220 mm.
 - .11 Number of stops : 2.
 - .12 Floors served: 2 front. (B & G).
 - .13 Cab inside dimensions: 2286 mm width X 2819 mm depth
 - .14 Hoistway door dimensions: 1220 mm width by 2134 mm height
 - .15 Door entrance: two speed side slide

.5 Elevator # 4

- .1 Service: passenger / service elevator Shall be designed to carry freight as per clause 2.16.1.3. Class A loading, as per clause 2.16.2.2.1 of the CAN/CSA B44-10.
- .2 Installation : hydraulic holeless elevator.
- .3 Operation : simplex collective
- .4 Number of cabs : one
- .5 Dimensions of cab : 1829 mm X 2565 mm
- .6 Capacity : 2268 kg.
- .7 Speed : 0.75 m/s.
- .8 Travel : 4.7 m.
- .9 Overhead : 4932 mm.
- .10 Pit : 1524 mm.
- .11 Number of stops : two (2).
- .12 Number of openings three (3): B front only & G front & rear
- .13 Hoistway interior: 2660 mm width x 3480 mm depth
- .14 Hoistway door entrance dimensions : 1066 mm width by 2134 mm height.
- .15 Car door : single speed center opening.
- .16 Hoistway doors one speed center opening.

.6 Elevator # 5

- .1 Service: LU/LA passenger / service elevator. Shall be designed to carry freight as per clause 2.16.1.3. Class A loading, as per clause 2.16.2.2.1 of the CAN/CSA B44-10.
- .2 Installation : roped hydraulic elevator.
- .3 Operation : SAPB
- .4 Number of cabs : 1
- .5 Capacity : 635 kg.
- .6 Speed : 0.15 m/s.
- .7 Travel : 5.5 m.
- .8 Overhead : 3352 mm.
- .9 Pit : 381mm.
- .10 Number of stops : 2.
- .11 Hoistway doors : 2 front (RC & 2).
- .12 Hoistway dimensions: 1676 mm width X 2007 mm depth.
- .13 Hoistway door dimensions : 1066 mm width par 2134 mm height.
- .14 Door speed : two speed side slide

.7 Elevator # 6

- .1 Service: general
- .2 Installation MRL electric elevator

- .3 Operation: simplex collective
- .4 Number of cabs : one (1) cab
- .5 Cab inside dimensions : 1981 mm X 1829mm.
- .6 Capacity : 1588 kg.
- .7 Speed : 0.75 m/s.
- .8 Rise : 13.4 m.
- .9 Overhead : 4890 mm.
- .10 Pit : 1524mm.
- .11 Number of stops : 5.
- .12 Doors : 4 front et 1 rear. (G, GR, 2, 3 & 4)
- .13 Hoistway dimensions: 2946mm width x 2616 mm depth
- .14 Dimension hoistway doors : 1066 mm width X 2134 mm height.
- .15 Door speed : one speed center opening
- .8 Hall Calls:
 - .1 Elevators to answer hall calls during working day; within following times:
 - .1 80% of calls within 30 seconds maximum.
 - .1 Elevator # 5 is not subject to these performances.
 - .2 Include smooth acceleration and deceleration of car without perceptible steps so adjusted as not to cause passenger discomfort.
 - .3 Elevator to travel between typical floors in not more than 13 seconds.
 - .1 Measure time from instant doors start to close until car has stopped level with next floor.
 - .1 Elevator # 5 is not subject to these performances.
 - .4 Permit doors to start opening in advance of stop at floor level such that doors are at least 3/4 open when car is stopped level with floor.
 - .1 Elevator # 5 is not subject to these performances.
- .9 Roller Guides: (elevators 1, 2, 3, 4 & 6 only)
 - .1 Provide spring loaded type car and counterweight roller guides.
 - .2 Provide each guide with durable, oil resistant and resilient rubber tired ball bearing rollers to run on three finished rail surfaces.
 - .3 Maintain each roller on its respective guide in uniform contact with rail surface at all time by means of substantial springs or by flexible mounting.
 - .4 Provide guide operation, which is inaudible to passengers in the car or outside of the hoistway with the car operating at rated speed and car fan turned off.
 - .5 Use roller tire material which will not develop flat spots after standing idle for 72 hours under average environmental conditions.
 - .6 Provide roller having a minimum of 150 mm in diameter.
 - .7 The counterweight and the car shall be statically balanced so as to have equal pressure on all contact points. Ensure that no more than 12 kg ($\pm 5\%$) of pressure at any one point of the elevator travel.

- .10 Sliding guides (elevator 5 only)
 - .1 Provide sliding guides capable of withstanding the wear due to the pressure against the rails for a minimum of 5 years of daily operation.
 - .2 Provide guide operation, which is inaudible to passengers in the car or outside of the hoistway with the car operating at rated speed and car fan turned off.
 - .3 The car guides inserts shall be easily replaced without the need of special tools.
- .11 Next Stop Feature: in case of over-speed, tripping of overload relay, or opening of motor-generator switch in corridor control panel, stop car at next floor rather than make emergency stop between floors when serving between local floors.
- .12 Automatic Self Levelling Feature: install self-levelling feature which will automatically bring car to floor landings. Correct for over-travel, independent of operating device.
 - .1 Maintain car floor level within 5 mm of landing floor with two-way automatic maintaining levelling device.
- .13 Home Landing: arrange G landing as home station by key operation.
- .14 Light Intensity: 150 lx maximum measured 0.75 m above floor. Totally enclose and conceal wiring and ballasts from view within car and finish ceiling.
- .15 Ventilation: ventilate by 2 speed 350 cfm on high speed and 255 cfm on low speed exhaust air handling unit through roof and through concealed perforations at base.
 - .1 Limit total fan noise to 55dB on "A" scale of General Radio Sound Level meter type 1551A from reading [0.9] m above floor with fan on high speed.
- .16 Tolerances: car movement on guide rails: smooth movement, with no perceptible lateral or oscillating movement or vibration.
 - .1 Guide rails shall be erected perpendicularly parallel and plumb within maximum deviation of 3 mm on the total length of the rise. They shall be supported and placed so as not to become distorted by eccentric loading.
- .17 Seismic Design Criteria: design and assemble elevator equipment and components to withstand earthquake forces in accordance with NBC, Zone 2 requirements.
 - .1 Include adjustable seismic trigger switches to operate elevators whenever predetermined level of seismic acceleration is detected:
 - .1 Prevent idle elevators from starting.
 - .2 Stop elevators at next available stop.
- .18 Machine room: verify machine room location on architectural layout.

2.5 MATERIALS

- .1 Materials: as required to achieve specified performance criteria; functionally compatible with adjacent materials and components.

2.6 CAR CAB

- .1 Car frame

- .1 The car frame shall consist of steel "U" channels and angles securely welded, bolted or riveted and substantially reinforced and braced so as to relieve the car enclosure of all strains.
- .2 Paint car top and header.
- .2 Top of car operating device
 - .1 Provide top of car operating device, with an alarm bell designed to operate on normal and emergency power, duplex receptacle, and work light. Provide two (2) permanent guarded lights on car top. One light fixture to be the moveable type with a magnetic base.
- .3 Car Enclosure
 - .1 Fabricate complete car enclosure of minimum 1.9 mm sheet steel. Enclosure walls to be solid to permit removal of raised panels without revealing any wall openings. Comply with ULC Standard, CAN/ULC- S102, Flame spread rating for cab walls and ceilings and ULC Standard, CAN4- S102.2, Flame spread rating for cab floors.
 - .2 Provide nickel silver car door sills.
 - .3 Provide minimum clear cab height of 2743 mm to underside of false ceiling if existing overhead clearances permit.
 - .4 All panels to be of the «hang-on type» designed for removal from inside the car cab. All fastenings are to be concealed. Where screws must be used they shall be of the vandal resistant type. Attach with flush mechanical fasteners.
- .4 Platform guards
 - .1 Provide platform guards according to clause 2.15.9
 - .2 Guards shall be constructed with rust resistant material or painted..
- .5 Car door and hangers
 - .1 Provide car doors of the size and type as specified in clause 3.4.2.
 - .2 Manufacture doors from steel sheet, smooth finish, of not less than 16 gauge steel.. Construct the door to withstand the strains imposed by the door operating equipment.
 - .3 Finish car side of door in stainless steel.
 - .4 Hang with the operating mechanism released, to close regardless of their position on the track,
 - .5 Provide two (2) suspension hangers for door panel rolling on appropriate tracks using rollers of not less than 82 mm diameter, coat grooves with resilient flexible material.
 - .6 Provide rollers with ball or roller sealed bearings designed to retain lubricant, equipped with cleaning and lubricating wiper to maintain rollers and track in clean condition.
 - .7 Absorb upthrust with heavy duty type adjustable eccentric rollers equipped with ball or roller bearings.
- .6 Car door operator

- .1 Provide a heavy duty high speed closed loop motor feedback door operator designed to open and close the car and hoistway doors simultaneously, quickly and smoothly.
 - .2 Operate doors positively, reliably and consistently under air pressure differentials.
 - .3 Open and close door operation to be electrically cushioned at final limits of door travel.
 - .4 Provide a gate switch for each door panel operated by a roller attached to the door panel.
- .7 Proximity detector
- .1 Provide a 3D infrared proximity detector with infrared beams equally spaced.
 - .2 Detector to protect the full door opening, such that a person or object passing through the car entrance causes the doors to re-open.
 - .3 The zone of protection shall extend from 12.7 mm above the sill to a minimum height of 1500 mm, on each car door panel.
 - .4 Device to be reliable and consistent in operation not affected by humidity or temperature changes and have inherent long term reliability with minimum maintenance.
- .8 Car operating panel
- .1 Provide in the car cab, a new car operating panel, with hinged stainless steel face plate and one service cabinet.
 - .2 Locate all buttons in accordance with Appendix E, of the B44 Code.
 - .3 Buttons to be stainless steel vandal resistant type. Provide raised numerals with braille to the left of each button. Attached plates will not be accepted. Where possible use international symbols. All other markings to be engraved on the faceplate in both official languages.
 - .4 Common devices to be included in the car station are as follows:
 - .1 Floor push buttons with integral illumination using LED type lights with a minimum 100,000 hour rating. Illuminate buttons with blue back lights and provide momentary audible signal when call is registered and extinguish the call when the car stops at the selected floor.
 - .2 Alarm, door open, and door close buttons.
 - .3 Lens for Emergency Lighting System as specified elsewhere in these specifications.
 - .4 Perforation holes for a hands free communication system, as specified elsewhere in these specifications. Provide a YELLOW International Telephone Symbol and engraved wording APHONE@. Provide an LED visual indicator and engraving, to indicate to persons with hearing disabilities that their call for assistance has been acknowledged.
 - .5 Visual and audible signal for Special Emergency Operation.

- .6 Provide verbal floor announcement as per clause E9.3 of B44 Code. Programming must be in both official languages. Provide a programmable system for personalized messages. The volume level will be adjustable between 50 and 70 dBA.
- .7 Provide in the car station a service cabinet with a hinged self-locking door. Provide switches inside the service cabinet, appropriately marked to control the following:
 - .1 Car Lights
 - .2 Car ventilating fan
 - .3 Test switch for emergency lighting
 - .4 Independent service switch
 - .5 Inspection KEY switch
 - .6 Emergency stop KEY switch
- .8 Engrave the elevator capacity in kilograms and number of persons
- .9 Car Position Indicator
 - .1 Provide in the car operating panel in the elevator a position indicator.
 - .2 Display letters and numbers for the digital position indicator in segmented format at least 50 mm in height. Use LED type, 100,000 hour rating, on a high resolution screen display. Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels. Some characters may have up to 3 letters.
- .10 Walls finishes
 - .1 All panels to be of the hang-on type designed for removal from inside the car cab. All fastenings are to be concealed.
 - .2 Hang on panels shall construct and installed according to CAN/CSA B44-10 code requirements.
 - .1 Elevators 1, 2 & 6 shall have plastic laminate covered panels with stainless steel reveals. The choice of colors shall be chosen amongst the standard selection of the manufacturer.
 - .2 Elevators 3, 4 & 5 shall have textured metal covered panels with stainless steel reveals. The choice of textured metal will be chosen amongst the standard product offering of the manufacturer.
- .11 Floor covering
 - .1 The elevator contractor must supply and install a tile floor covering for elevators 1, 2 & 6. The tile flooring specification can be referenced in section 09 30 13. The tile flooring will be flush with the car door sill.
 - .2 The elevator contractor must supply and install an aluminum checker plate, type 6061-T6 alloy, floor in the elevator 3, 4 & 5. The checker plate must be flush with the car door sill.
- .12 Ceiling:

- .1 Provide and install a stainless steel suspended ceiling with six (6) LED pot lights for elevators 1,2,3 ,4 & 6 and four pot lights for elevator # 5.
- .2 Ensure that the cab lighting is sufficient so as to have a minimum of 150 lx measured at the car cab sill.
- .3 Lights must be removable from the interior of the cab without the assistance of elevator personnel.
- .13 Front returns:
 - .1 Provide stainless steel returns, headers and columns.
- .14 Elevator protective wall covering pads
 - .1 Provide code approved pads for each elevator.
 - .2 Pads shall cover all walls and also the front returns. Provide C.O.P. cut-outs.
 - .3 Provide permanently fastened pad hooks at 2133 from the floor. Each pad hook shall be spaced out no greater than 300 mm.
- .15 Central alarm and control center
 - .1 Provide and install a stainless steel panel incorporating the following:
 - .1 Car position indicator for each elevator;
 - .2 Phase 1 key switch and visual indicator;
 - .3 Priority recall key switch for each elevator;
 - .4 Neatly mount and secure wiring;
 - .5 All connections must be done on approved connector strips;
 - .6 All signage must be engraved and in both official languages or in international signage;
 - .7 No equipment is to be mounted to the faceplate;
 - .8 The faceplate must be mounted on hinges;
 - .9 Provide a communication system that meets clause to 2.27.1.1.

2.7 TEMPORARY ELEVATOR

- .1 The installation of elevator # 4 will be prioritized in order to assist in the construction activities of the building.
 - .1 Enclose cab with plywood floor, walls and ceiling. Provide temporary lighting, control panel with emergency operation and key operation for attendant operator.
 - .2 Co-ordinate temporary use of elevator in accordance with Section 01 52 00 - Construction Facilities.
 - .3 Include the costs for a complete hoistway clean down and equipment adjustment prior to returning elevator to regular service.

2.8 POWER SUPPLY

- .1 Equipment Power: 600 V, amperage to be established by the elevator contractor. 3 phase, 3 wires, 60 Hz, alternating current normal supply.

- .2 Lighting: 120 V, 15 amps, single phase, 1wire, 60 Hz, alternating current normal supply for cab lighting.
- .3 Communication system: 120 V, 15 amps, single phase, 1wire, 60 Hz, alternating current normal supply for communication devices battery

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for elevator installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and data sheet.

3.3 INSTALLATION

- .1 Install hoistway, machine room, and other elevator materials and components in accordance with ASME A17.1/CSA B44-10, local codes, regulations and manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its product[s] and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Obtain reports, within [3] days of review, and submit, immediately, to Departmental Representative.

3.5 SITE TESTS

- .1 Perform and meet tests required by ASME A17.1/CSA B44-10.
- .2 Supply instruments and execute specific tests.
- .3 Furnish test and approval certificates issued by jurisdictional authorities.
- .4 Perform a full load full speed safety test.
- .5 Test all elevator components as per section 8.10 of the CAN/CSA B44-10 code.
- .6 At agreed time during twelve month warranty period and with building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of hall call registrations, time initiated, and response time throughout entire normal working day.

3.6 ADJUSTING

- .1 Adjust door opening and closing times to suit handicapped users in accordance with appendix E of the CAN/CSA B44-10 code
- .2 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed 11.5 to 12.5 seconds in both directions. Adjust for smooth acceleration and deceleration of car so as not to cause passenger discomfort. Elevator # 5 is excluded from these requirements.
- .3 The variation of speed shall not change by $\pm 2\%$ in either the up or down directions independent of car load.
- .4 Car door operation
 - .1 The time required to open the doors measured from start of open to fully open position shall not exceed 2.0 seconds.
 - .2 The time required to close the doors measured from start of close to fully closed position shall not exceed 3.0 seconds.
- .5 Ride performance
 - .1 Adjust the equipment to allow the car to start, accelerate, decelerate and stop smoothly.
 - .2 Adjust deceleration to the negative of the acceleration with final ramp being equal to the initial.
- .6 Noise levels in elevator cab
 - .1 Arrange the equipment so that the maximum ambient noise levels as read from 0.9 m above the floor do not exceed the following levels under the stated conditions of operation. Assume a maximum corridor ambient noise level of 45 dBA.
 - .1 Inside the car with doors closed, fan off, and car running not to exceed 60 dBA.
 - .2 Inside the car, with the fan off, during full door opening and closing not to exceed 65 dBA.

- .3 Inside the car, with the fan off, during door reversal not to exceed 65 dBA.
- .7 Adjust automatic floor levelling feature at each floor shall be within ± 5 mm regardless of direction of travel and weight in the elevator cab.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove protective coverings from finished surfaces and components.
 - .2 Clean surfaces and components ready for inspection.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by passenger elevator installation.

3.9 MAINTENANCE

- .1 Furnish complete service and maintenance of elevator system components during building contract.
- .2 Systematically; examine, clean, adjust, and lubricate equipment as per planned maintenance tasks and frequencies as established by the CAN/CSA B44.2-07 code. The contractor must supply and ensure updates of the maintenance log book # 495.8J.
- .3 Maintenance shall include systematic examination, adjustment and lubrication of elevator equipment; repair or replace parts whenever required.
 - .1 Use genuine parts produced by the manufacturer of specific equipment.
 - .2 Replace wire rope as necessary to maintain required factor of safety.
- .4 Perform work without removing cars during peak traffic periods.
- .5 Provide emergency call back service at all hours for this maintenance period.
- .6 Maintain locally, near place of work, an adequate stock of parts for replacement or emergency purposes and have qualified installation personnel available to ensure fulfillment of this maintenance service without unreasonable loss of time.
- .7 Perform maintenance work using competent personnel, under supervision and in direct employment of the elevator manufacturer.

- .8 Do not assign or transfer maintenance service to any agent or subcontractor without prior written consent of Departmental Representative.

END OF SECTION