

PART 1 - GENERAL**1.1 RELATED SECTIONS**

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| .2 | Section 01 14 25 | Designated Substances Report |
| .3 | Section 01 32 16.07 | Construction Progress Schedule - Bar (GANTT) Chart |
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1.2 DESCRIPTION OF SYSTEMS

- .1 The characteristics of the existing geared freight elevator is as follows:

FREIGHT ELEVATOR - LOW RISE

Elevator No.:	6
Installation No.	10789
Original Manufacturer:	Otis Elevator
Machine Type :	Otis # 38 BT
Drive Type:	Motor generator
Control Type Relay Based:	Otis 30 UCL
Rated Speed:	Retain .76m/s
Rated Capacity:	Retain 4540kg
Existing Car Door Operator:	Otis Type F
Door Type:	Vertical Bi-Parting
Door Size:	2387 mm wide x 2135 mm
Floors Served	6
Type of Operation:	Simplex Selective Collective Automatic
Car Operating Panels:	One
Life Safety Features:	Automatic Firefighter's Emergency Operation Phase I and II

1.3 DESCRIPTION OF WORK

- .1 This Section covers the engineering, fabrication, and modernization of One Geared Low Rise Freight Elevator located at 875 Heron Road.
- .2 Before the execution of the work, verify all dimensions with actual site conditions. All new equipment to be designed to meet existing space provisions.
- .3 Provide all materials, labour, design, manufacturing, inspection, and testing as required to complete the work as specified in these Contract Documents.
- .4 Commission all components, systems, and integrated systems in accordance with the requirements of Division 1.
- .5 Arrange and pay for all permits, certificates, inspections, and tests required by the governing authorities, including TSSA Design Submissions and initial and follow-up inspections.
- .6 Where a device or component is mentioned in the singular number, such references shall be understood to mean that this Section shall provide as many of said devices or components as is necessary for the completion of the elevator covered under this Section.
- .7 All equipment being replaced shall become the property of this Section, and as such, it is the responsibility of this Section to remove it from the premises in a prompt and orderly manner.
- .8 Include all related building work required to complete the modernization of the elevators.
 - .1 Machine Room
 - .1 Patch with cement, all redundant holes in machine room floor resulting from the removal of redundant elevator equipment.
 - .2 Provide coordination, wiring, and connections from the controller to the emergency power transfer switch for the emergency power and pre-transfer signals. To be confirmed
 - .3 Provide a Code Data Tag on controller as per clause 8.9.1 of the B44 Code.
 - .4 Provide a permanent sign in elevator machine room indicating the specified temperature and humidity range requirements for the elevator equipment to ensure safe and normal elevator operation.
 - .5 Provide an Alteration data plate or laminated copy of alteration data sheet on controller as per B44 Code requirements.
 - .6 Provide a licence frame holder for the elevator licence to be installed on the front of the controller door. Indicate on TSSA design submission that licence will be located in the elevator machine room.
 - .7 Provide a metal drip pan under the roof drain if drain runs above control or drive equipment.

Description of Work - cont'd

- .8 Reduce the space to a minimum around the hoist cable holes in the machine room floor.
- .9 Provide a metal maintenance cabinet in the machine room.
- .10 Provide a metal container complete with a lid for the storage of oily rags, redundant parts and papers etc.
- .2 Secondary Level
 - .1 Provide a new positive action stop switch for the elevator. Provide red operating handle or push button. Identify Stop and Run position. Number the stop switch to correspond to the appropriate elevator.
 - .2 Provide new and safe access to the secondary level as described in the Architectural Drawing No. _____
- .3 Car Top
 - .1 Provide updated crosshead data plate on car top as per code requirements indicating the year of the modernization and the Contractors name. Retain existing crosshead data plates.
 - .2 Paint the elevator number on the crosshead minimum 50mm high.
 - .3 Provide two (2) permanent guarded lights on car top. One light to be a moveable type with a magnetic base.
 - .4 Provide a metal safety railing on the car top to comply with TSSA Ruling Reference No. 245/10. Paint guard yellow.
 - .5 Paint the TSSA installation number on the crosshead minimum 50mm high.
 - .6 Provide a cab alteration data plate on car top.
 - .7 Legibly and completely fill in and install the hoist and governor rope tags on the car top.
- .4 Hoistway
 - .1 Thoroughly clean down hoistway at completion of work.
 - .2 Bevel all projections in the hoistway that protrude more than 100mm.
 - .3 Run all new telephone, communication, elevator security and fire alarm lines and conduit in the hoistway and to the machine room. Others will run lines to the hoistway and provide sufficient wiring to reach machine room. Elevator Contractor to supply and install the conduit in the hoistway. All fire alarm wiring must be run in a separate conduit.

Description of Work - cont'd

- .5 Pit
 - .1 Provide Two (2) new positive action disconnect switches in the pit. locate one switch near top of ladder. Paint switches RED in colour, identify stop and run positions.
 - .2 Extend pit ladder to 1524mm above sill where access to the pit is from the bottom floor hoistway door.
 - .3 Provide a permanent runby sign in the pit in close proximity to the counterweight buffer or buffer stand.

1.4 REFERENCE STANDARDS

- .1 Comply with all building codes, by-laws, regulations, directives, and ordinances as set forth and mandated by Federal, Provincial, and Municipal Authorities, in effect at the time of installation.
- .2 ASME A17.1-2010/CSA-B44-10 Safety Code For Elevators, including latest supplements and Appendix E, Elevator Requirements For Persons with Physical Disabilities.
- .3 Technical Standards And Safety Act 2000 O.Reg 209/01, Elevating Devices Code Adoption Document and O.Reg.222/01 Certification and Training of Elevating Devices Mechanics.
- .4 CSA B44.2.07 - Maintenance requirements and intervals for elevators, dumbwaiters, escalators and moving walks.
- .5 CSA Standard B651-04 Accessible Design For The Built Environment.
- .6 The National Building Code Of Canada - 2005.
- .7 CAN/CSA-B44.1-11/ASME A17.5 2011 Elevator and Escalator Electrical Equipment.
- .8 CSA Standard Z432-04 - Safe Guarding of Machinery.
- .9 CSA Standard C22.1 - 09 Canadian Electrical Code Part 1. Section 38.
- .10 The latest copy of the TSSA Code Adoption Document.

1.5 DEFINITIONS OF TERMS

- .1 All terms in the specifications that are not otherwise defined shall have the definitions as given in the B44-10 Safety Code For Elevators.
- .2 The term "refurbish", shall mean to carry out all labour, painting or modifications to parts, etc, which will result in returning the original component to a "like new" condition.
- .3 Where the terms "furnish" or "provide" are used, it shall mean to supply and install new equipment.

1.6 SIMPLEX SELECTIVE COLLECTIVE OPERATION

- .1 General Operation: For Freight Elevator Number 6.
- .2 Provide a micro-processor based selective collective control system.
- .3 Dispatch car to corresponding landing upon momentary pressure of car or hall call buttons.
- .4 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for preset 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.
- .5 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.
- .6 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.
- .7 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.
- .8 If DOWN hall calls are registered while car is travelling UP, do not stop for these calls but allow calls to remain registered.
- .9 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
- .10 When lifting the rated load, do not permit the car speed to vary from the rated speed by more than 5%.
- .11 Do not start the car unless the car doors are in the closed position, and all hoistway doors are locked in the closed position.
- .12 Provide "OUT OF SERVICE" lights at each hall station.

1.7 NEXT FLOOR EMERGENCY STOP FEATURE

- .1 In the case of over speed due to maladjustment of equipment, stop elevator at next floor.

1.8 FIREFIGHTERS' EMERGENCY OPERATION

- .1 Provide automatic "Firefighters' Emergency Operation" in accordance with the CSA-B44 Elevator Safety Code and the National Building Code of Canada, including all requirements for High Buildings.
 - .1 Provide an additional key-operated "FIRE RECALL" switch with two positions marked "OFF" and "ON" in that order, at "Building Fire Control Station" only.

1.9 FIRE OPERATION PANEL

- .1 The "FIRE OPERATION" switch, the "CALL CANCEL" button, the "STOP" switch, the door open button(s), the door close button(s), the additional visual signal and the operating instructions shall be grouped together at the top of a main car operating panel behind a locked cover.
- .2 The firefighters' operation panel cover shall be openable by the same key that operates the "FIRE OPERATION" switch. The cover shall be permitted to open automatically when the car is on Phase I Emergency Recall Operation and at the recall level.
- .3 When the key is in the "FIRE OPERATION" switch, the cover shall not be capable of being closed. When closed, the cover shall be self-locking. Where rear doors are provided, buttons for both the front and rear doors shall be provided in the firefighters' operation panel. The door open and door close buttons for the rear entrance shall be labelled "OPEN REAR" and "CLOSE REAR."
- .4 All buttons and switches shall be readily accessible, located not more than 1800 mm above the floor. The front of the cover shall contain the words "FIREFIGHTERS' OPERATION" in red letters at least 10 mm high.

1.10 FIREFIGHTERS' OPERATION INSTRUCTIONS

- .1 Instructions for the operation of the elevator on Phase I Emergency Recall shall be permanently incorporated with, or adjacent to the "FIRE RECALL" switch at the designated level.
- .2 Instructions for the operation of the elevator on Phase II Emergency In-Car Operation shall be permanently incorporated on the rear of the fire panel door, in or adjacent to the operating panel in each car.
- .3 The instructions shall be in letters not less than 3mm in height and shall be permanently installed and protected against removal or defacement.

1.11 FIREFIGHTERS' EMERGENCY OPERATION KEY - FEO-K1

- .1 Provide a standard firefighters' operation key (FEO-K1).
- .2 The key shall be of a tubular type, 7-pin, style 137 construction and have a bitting code of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key.
- .3 The same FEO-K1 key shall operate the elevator emergency power selector switch when provided, the fire recall switch and fire operation panel door.
- .4 The keyswitches shall be of the Group 3 Security.

1.12 IDENTIFICATION

- .1 Provide 100mm numerals corresponding to floor level on inside of hoistway doors.
- .2 Provide 50mm numerals on all elevator equipment in machine room and pit. Include permanent numbers engraved in the elevator.
- .3 Provide all necessary engraving on faceplates as required by the Departmental Representative, in English and French, Helvetica medium, upper and lower case.
- .4 All fastenings of cover plates for signals, buttons and panels shall be tamper proof type.
- .5 Identify the elevator at designated level floor. Use metal plates permanently installed with rivets or a permanent type glue. Numbers to be minimum 50mm high.
- .6 Provide raised character and braille floor designations on both door jambs minimum size 50mm. Locate centre-line of numeral 1525 mm above floor level measured from the base line of the characters.
- .7 At the main entry level on both door jambs provide a 50mm raised star designation to the left of the floor designation number. All characters to comply with Clause E-17.
- .8 Provide 50mm elevator identification number on machine and governor guards in the machine room.

1.13 AUTOMATIC EMERGENCY POWER OPERATION

- .1 Provide Automatic Emergency Power Operation in accordance with the B44 Safety Code For Elevators.
- .2 Operating Devices:
 - .1 Provide in the elevator lobby at the designated level an LED signal light marked "ELEVATOR EMERGENCY POWER" to indicate that the emergency power is in effect.
 - .2 A signal, provided from the transfer switch, will indicate to the elevator control system, that the system is now operating on the emergency power supply.
- .3 Operation:
 - .1 When the signal has been provided to the elevator controller indicating that emergency power conditions are now in effect, the elevator shall be returned to the designated floor level and park with the doors open.

Automatic Emergency Power Operation - cont'd

- .2 When the signal is provided to the elevator controller that normal power conditions are now in effect the elevator shall be started automatically.
- .3 Transfer from emergency power to normal power will be adjustable. Design elevator control system to compensate for any power variance which may occur during transfer and automatically re-instate normal operation following stabilization of power supply.
- .4 During testing conditions, on pre transfer to and from emergency power, arrange that the car and hoistway doors remain open at the landing for at least 20 seconds prior to transfer or until the emergency or normal power is restored.

1.14 INDEPENDENT SERVICE OPERATION

- .1 Provide independent service operation by means of a key operated switch in the elevator to allow the car to operate independently in response to car calls only.
- .2 Park the car with the doors open, and respond to a selected car call by constant pressure on the door close button, provided, that the doors have been closed and the interlock is made-up. Arrange for the doors to reopen if the constant pressure on the door close button is released at any point prior to the car starting.
- .3 Place the direction of travel under the control of the attendant. Arrange the operation to cancel all registered car calls, and by-pass registered hall calls. Do not operate hall lanterns when stopping at a floor.

1.15 ELEVATOR PERFORMANCE

- .1 Provide smooth acceleration and deceleration of car without perceptible steps so as not to cause passenger discomfort.
- .2 Comply with all performance requirements as detailed in Part 3 of this specification.

1.16 SAMPLES

- .1 Refer to Section 01 33 00 - Submittal Procedures
- .2 Submit samples for each of the following component for review by the Departmental Representative
 - .1 Car and Hall operating fixtures.
 - .2 Hall Position indicator fixtures

1.17 SUBMITTALS

- .1 Refer to Section 01 33 00. Submit shop drawings as required to include the following information.
- .2 Provide six (6) copies of all drawings for Departmental Representative's review.
- .3 Indicate on shop drawing the following information:
 - .1 A layout of the elevator equipment located in the machine room including all retained and new equipment complete with dimensions and weight.
 - .2 Characteristics of the equipment located in the machine room including KVA rating of transformer and heat dissipation of equipment.
 - .3 Size of wiring from the mainline disconnect switch to the transformer and controller.
 - .4 Car and hall operating fixtures and indicators details showing materials and finish.
 - .5 Hoist rope brake mounting drawings and components.
 - .6 All Firefighters and Emergency Power Operation Panel at the designated level.
 - .7 All technical information and operating instructions for the elevator communication system.
 - .8 Do not order any materials until all shop drawings are approved.

1.18 RECORD DRAWINGS

- .1 Provide record drawings as required by Section 01 78 00 - Closeout Submittals.
- .2 In addition, provide schematic wiring diagrams, including all changes made in final work, covering electrical and solid state equipment as supplied and installed, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
- .3 All changes to the wiring diagrams must be marked up in RED and stamped by a Registered Professional Engineer.
- .4 Provide a letter from a Registered Professional Engineer confirming that the marked up drawings are complete and are "as built".
- .5 Provide three (3) sets of final issue shop drawings, and three (3) copies of "as built" wiring diagrams. All drawings to be laminated.
- .6 Provide an electronic copy of final "as built" wiring diagrams and fixture drawings.

1.19 OPERATION AND MAINTENANCE MANUALS

- .1 Provide all information necessary for the safe and efficient maintenance of the equipment and incorporate into the maintenance manual as required by Section 01 78 00.
- .2 In addition to the requirements of Section 01 78 00, the maintenance data must include the following information:
 - .1 Description of system's method of lubrication, operation and control including, video monitor, motor control system, door operation, signals, fire-fighter's service, emergency power operation, and special or non-standard features provided.
 - .2 As built schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
 - .3 Copies of the TSSA registered design submissions.
 - .4 Copies of TSSA initial and final inspection reports.
 - .5 Signed copy of the Warranty Letter.
 - .6 Parts catalogue giving complete list of repair and replacement parts with cuts and identifying numbers.
 - .7 All technical information and operating instructions for the elevator and machine room communication system.
- .3 Maintenance: Use clear drawings, diagrams or manufacturer's literature which specifically apply and detail the following:
 - .1 Lubrication products and schedules
 - .2 Troubleshooting procedures
 - .3 Adjustment techniques
 - .4 Operational checks
 - .5 Maintenance of special finishes
 - .6 Planned maintenance tasks and their frequencies
- .4 Equipment: Information of each piece of equipment will be assembled in the following order. Equipment details such as:
 - .1 Approval drawing number
 - .2 Model, part and serial number

Operation and Maintenance Manuals - cont'd

- .5 Spare Parts:
 - .1 List of recommended spares to be maintained on site to ensure optimum efficiency
 - .2 List of all special tools and appropriate unique applications
 - .3 Detail manufacturer and supplier names and addresses
 - .4 All equipment is to be listed as to types
 - .5 The Contractor is to permanently attach any service or diagnostic tool access code numbers to each controller at the completion of the project. Any special tools, hand held devices, computers etc. required for the operation, testing, adjusting or setting parameters for the controller or car door operator must be left on-site in the machine room
- .6 Maintenance Control Program:
 - .1 Provide with the O & M manuals a copy of the approved maintenance control program for the elevator.

1.20 MAINTENANCE SERVICE UNDER THIS CONTRACT

- .1 Include full maintenance service as described below, for the elevator from the time of contract award until the issuance of the Final Certificate of Completion of the modernization project.
- .2 The Long Term PWGSC maintenance contract, which forms part of the combined bid, will commence one month after the issuance of the Final Certificate of Completion of the modernization project.
- .3 Perform all Tests and Examinations as required by CAD Section 8.6. The CSA-B44 Safety Code For Elevators, including any Supplements and the B44.2-07 Code. The frequencies specified in the B44.2-07 Code are a minimum. Should on-site conditions or manufacturers recommendations require more frequent procedures they shall be increased accordingly.
- .4 Maintenance to include semi-monthly systematic examination, cleaning, adjustment and lubrication of elevator equipment and the repair or replacement of all defective parts due to normal wear and tear. Do not remove elevators from service during peak traffic periods. Use only genuine parts produced by the manufacturer of the equipment.
- .5 Provide a minimum of one (1) hour of preventive maintenance per maintenance inspection.
- .6 Provide call back service 24 hours per day, seven (7) days per week during regular working hours, and the release of trapped persons at any hour, at no extra charge. The response time to remove trapped passengers during regular working hours shall be no longer than 30 minutes and no longer than 60 minutes after hours.

Maintenance Service Under This Contract - cont'd

- .7 Maintain on site an adequate stock of parts for replacement or emergency purposes. Have qualified personnel under the supervision and in the direct employ of the Contractor available to ensure fulfilment of this maintenance service without unreasonable loss of time.
- .8 Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Departmental Representative.
- .9 Maintain in the elevator machine room one (1) copy of the schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus. Laminate all wiring diagrams.
- .10 Provide a permanent log for the elevator with pre-numbered pages having the following information: date, time, regular maintenance, regular and overtime call back, names of maintenance technician, action taken, work completed and additional repairs required.
- .11 The log - which is part of the maintenance control program - shall be the property of the Departmental Representative and shall be kept on the job site and available at all time for the Departmental Representative's verification.
- .12 Make all entries in ink, legibly, consecutively and without blanks.
- .13 Provide in each elevator machine room a metal cabinet for the storage of approved lubricants and cleaning supplies. Provide a metal storage can for waste and oily rags.
- .14 All maintenance technicians and supervisors shall be dressed in company uniforms and must register with the designated building personnel.
- .15 Adjust the control system for optimum operation towards the end of the warranty period when the building is occupied.

1.21 MAINTENANCE CONTROL PROGRAM

- .1 At no cost to the Departmental Representative, provide for each elevator a maintenance control program (MCP) as per Clause 8.6.1.2.1 of the **B44 Code**. Elevator Consultant will be providing requirements from the Elevator Maintenance Specifications; to the successful bidder, to be incorporated into the MCP and signed as required by the maintenance specifications frequencies and requirements.

1.22 SCHEDULE

- .1 Refer to Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) chart.
- .2 In addition to Section 01 00 10, the following also applies.
- .3 All major components such as: machines, controllers, drives, crates of equipment, etc. must not be transported in the operating elevators during regular working hours. Any use of the operating elevators for moving equipment must be done after hours or on weekends , at no additional cost and must have the approval of the Departmental Representative.
- .4 Carry out any odour, loud communication, or noise generating work and interior painting after normal working hours of the building and at a time which is acceptable to the Departmental Representative. Thoroughly ventilate areas painted during "off hours".

1.23 POWER SUPPLY

- .1 The existing Motor and Controller 600 Volts 3 Phase, 3 Wire , 60 Hz power supply will be retained.
- .2 The existing elevator Cab Lighting 120 Volts, 1 Phase, power supply will be retained

1.24 MARKINGS

- .1 All identification, instructions, and position indicators are to be in English and French.
- .2 English is to appear first on all marking or engravings and instructions.

1.25 USE OF ELEVATORS FOR PERSONS WITH PHYSICAL DISABILITIES

- .1 Fully comply with the requirements of Appendix E of the B44 Safety Code For Elevators and all other governing codes and regulations.
- .2 Locate all new car and hall operating buttons to comply with Appendix E requirements
- .3 Locate the PHONE button in the cab to be at 1220mm above the floor.

1.26 QUALITY OF WORK

- .1 The Contractor shall take into consideration the fact that this is an occupied building and must continue to function during the course of the modernization with a minimum of disruption.
- .2 The Contractor's employees shall be appropriately attired in Company Uniforms, be courteous to the occupants and abide by the same building rules and regulations required of the occupants.

Quality of Work - cont'd

- .3 All work must be performed in a manner that ensures the safety of the occupant and the user of the operating elevators. Should it be necessary to perform work where such safety cannot be ensured, it shall also be performed at a time acceptable to the Departmental Representative and during hours other than normal building business hours at no additional cost to the Departmental Representative.
- .4 All hoarding around hoistway entrances shall be removed at the end of the modernization.
- .5 Provide barricades as required to protect the Public from hazardous conditions. Obtain Departmental Representative's approval for the appearance of all barricades erected.

1.27 TECHNICAL SEMINAR

- .1 Upon completion of the project, arrange with the Departmental Representative to provide two (2) seminars.
- .2 Each seminar shall include a complete review of all documentation, operation of the elevator equipment, and demonstration of special features and all life safety elevator operations. Allow a minimum of four (4) hours for each seminar.
- .3 All seminars to be carried out in both official languages.

PART 2 - PRODUCTS**2.1 MATERIALS AND COMPONENTS**

- .1 Use major elevator components from standard product line of one manufacturer
- .2 Major components includes; electrical controller, car door control equipment, and solid state motor drives.
- .3 All materials and equipment shall be new, and of the best quality of their respective kind. Furnish samples as directed by the Departmental Representative.
- .4 Provide only systems designed and field tested for the application, with adequate capacity to meet all performance criteria and to provide long term reliable operation.
- .5 All retained equipment shall be thoroughly refurbished, cleaned, painted and tested as required to ensure safe and proper operation and compliance with the B44 Code.
- .6 Paint to latest MPI requirements.

2.2 ELECTRICAL WIRING, CONDUIT AND FITTINGS

- .1 Provide all new B44 Code approved insulated wiring to connect all parts of the equipment including all wiring in hoistway, car top and car enclosure.
- .2 Provide new wiring from the mainline disconnects to the controller and transformer.
- .3 Provide all new wiring from the controller to the drive machine.
- .4 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct or conduit.
- .5 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 and identified on the controller.
- .6 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. Identify junction box as to it's function.
- .7 Provide ten percent (10%) additional minimum spare wires.
- .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.
- .11 Mark all individual wires by numbered adhesive waterproof markers.

Electrical Wiring, Conduit and Fittings - cont'd

- .12 Limit the use of flexible conduit on the car top to only those items that require movement or periodic adjustment. Use of excessive flexible conduit on car top will be rejected.
- .13 All flexible conduit that rests on the car top must be installed in a uni-strut which is at least the same height as the conduit.
- .14 The maximum number of conductors of one size in conduit or tubing must be in compliance with Table 6 of the Canadian Electrical Code. The maximum allowable per cent conduit and tubing fill must be in compliance with Table 8 of the Canadian Electrical Code.
- .15 Identify wires of multi-wire cables by colour code.
- .16 Label all terminal and junction boxes as to their function with permanently attached waterproof labels
- .17 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
- .18 Provide stranded field wire with no splices.
- .19 Provide uninterrupted shielded wiring from the communication device in the elevator to the junction box located on the side of the controller.
- .20 Attach to each controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
- .21 Provide a supplementary, uninterrupted shielded cable running from machine room to each 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.
- .22 Do not use armoured flexible metal conduit as grounding conductor. Provide a separate ground wire in all flexible metal conduit where grounding is required.
- .23 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.
- .24 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600 mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .25 Provide a separate identified green 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.
- .26 The conductors to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian Electrical Safety Codes. The wiring must be rated for 200E centigrade and be of the SF type or equivalent.
- .27 Neatly tie up or lace up and identify all spare wires in the controller.

2.3 EXISTING ELECTRICAL SERVICES

- .1 Design the equipment to operate using the existing 3 phase power supply. The voltage supply may fluctuate by $\pm 10\%$.
- .2 Provide a true earth ground, shielding, or bonding as required to suit the new elevator equipment. The true earth ground wire is to be the same size as the feeder wires.

2.4 TRAVELLING CABLES

- .1 Replace all travelling cables with new B44Code approved flexible travelling cable designed specifically for elevator use. Provide type ETT cables.
- .2 Terminate cables on terminal blocks having identifying numbers to facilitate replacement and service.
- .3 Provide travelling cable with flame retarding and moisture resisting outer covers.
- .4 Suitably suspend the travelling cables to relieve strain in the individual conductors, (using a steel supporting strand with appropriate supports if the suspended weight exceeds 34 kg).
- .5 Provide ten percent (10%) additional minimum spare wires in each travelling cable.
- .6 Provide in the travelling cables, at least six (6) pairs, uninterrupted shielded wires.
- .7 Suspend and connect travelling cables so that they hang freely in the hoistway and do not rub against hoistway wall, trimmer beams, or brackets.

2.5 LUBRICATION

- .1 Include means of lubricating bearings, requiring periodic lubrication.
- .2 When used, provide all grease fittings to fit same gun.
- .3 Provide visible and easily accessible lubrication points.

2.6 GUIDE SHOES

- .1 Provide new swivel type guide shoes for car and counterweight. Assemble on metal base to permit self-alignment.
- .2 Equip each guide shoe with renewable, non-metallic wearing gibs or inserts and spring take-up for side play between guide rails.
- .3 Include renewable wearing guide shoe gibs made of durable non-metallic material having low coefficient of friction and long wearing qualities when operated on guide rails receiving infrequent light applications of rail lubricant.
- .4 Do not use guide shoe gibs containing graphite or extreme pressure type lubricants which may adversely affect performance of safety.
- .5 Use solid type guide shoes for car and counterweight, of metal construction, fitted with renewable cast-iron wearing gibs or inserts.

2.7 SUSPENSION ROPES AND WEDGE CLAMP FASTENINGS

- .1 Provide new steel wire rope constructed for elevator service.
- .2 Ropes installed on any one elevator, shall be from the same factory production run.
- .3 Provide approved type wedge socket wire rope fastenings only
- .4 Provide individual compression springs on one end to equalize tension in ropes.
- .5 The returned end of the wire ropes on wedge clamp fastenings are to be secured with two (2) retaining clips. The first clip is to be set approximately 50mm above the top of the wedge clamp, the second clip at 100 mm above the first clip. The end of the wire rope is to be bound and tied or taped to prevent injury.
- .6 Provide minimum 16mm diameter metal anti-rotation devices to secure all terminations after installation to prevent rotation of fastenings in hitch plates.
- .7 Provide six (6) 16mm diameter hoisting ropes.
- .8 Do not use Lang Lay ropes.

2.8 GUIDE RAILS AND FASTENINGS

- .1 Check car and counterweight guide rail alignment and plumb same within maximum variation of 1.5 mm over any 6.1 m section.
- .2 Check all fastenings, brackets and fish plates to ensure secure and solid attachment of rails.
- .3 Use a rail gauge at each floor level for car and counterweight rails to check the distance between guides and rail alignment.
- .4 Thoroughly clean car and counterweight guide rails to ensure smooth operation of the guide shoes.

2.9 INTERMEDIATE BEAMS

- .1 Check all intermediate beams and brackets for secure fastening to hoistway structure. Securely fasten any loose brackets or beams.

2.10 BUFFER EXTENSION AND SUPPORTS

- .1 Retain and refurbish all buffer extensions.

2.11 SPRING BUFFERS

- .1 Retain and refurbish existing car and counterweight spring buffers.
- .2 Ensure that the buffer data plates to ensure plates are legible.

2.12 PIT EQUIPMENT

- .1 Retain and refurbish all pit equipment. Thoroughly wire brush and inspect all buffer channels.

2.13 COUNTERWEIGHT

- .1 Thoroughly inspect counterweight frame, bolts and fastenings for tightness.
- .2 Re-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 Statically balance the counterweight, so that at the centre of the hoistway the counterweight hangs in the centre of the rails with the top guides removed.
- .4 Check runby and post sign in the vicinity of the counterweight buffer indicating the maximum designed runby for this installation.
- .5 Check and tighten counterweight rods or clamps to ensure that there is no rattling or vibrating of counterweight blocks or bricks.
- .6 Provide four (4) separate steel retaining guides to prevent the counterweight from leaving the guide rails in event that the guide shoe assemblies leave their attachments. The retaining arrangement is to be fastened to the counterweight frame independent of the primary guiding means. Paint new guiding means YELLOW.

2.14 CAR FREE-FALL SAFETY

- .1 Check safety device for operation in accordance with the B44 Code.
- .2 Retain and refurbish all parts of safety mechanism under elevator. Thoroughly clean off all safety mechanism, including releasing carriage on car top.
- .3 Perform full load overspeed test in the presence of the Departmental Representative.

2.15 CAR OVERSPEED PROTECTION

- .1 Provide means to prevent a car from Overspeeding in the ascending direction of travel in accordance with the B44 Code. Include all materials, new hoist ropes 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 overspeed, 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 Provide a hoist rope brake device to perform this safety feature
- .5 Contractor to submit details of proposed device to Departmental Representative for review.

2.16 CAR UNCONTROLLED LOW SPEED PROTECTION

- .1 Provide means to prevent any uncontrolled movement of the car in accordance with 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.
- .4 Provide a hoist rope brake device to perform this safety feature.
- .5 Contractor to submit details of proposed device to Departmental Representative for review.

2.17 CAR OVERSPEED GOVERNOR AND ROPE

- .1 Provide a new overspeed governor to suit the speed and capacity of the elevator.
- .2 Remove paint from pins and lubricate all pivot points.
- .3 Spin test and reseal governor.
- .4 Provide new governor rope.
- .5 Provide a new governor tension sheave in the pit.
- .6 Calibration of the governor shall be checked in the presence of the Departmental Representative.

2.18 GOVERNOR OVERSPEED SWITCH

- .1 Provide a governor overspeed switch to comply with Clause 2.18.4 of the B44 Code.

2.19 GEARED TRACTION MACHINE

- .1 Retain existing geared machine. Refurbish complete machine to provide long term operation.
- .2 Open up gear case, thoroughly examine ring gear, examine all bolts in ring gear assembly, tighten any loose nuts and replace any worn or missing bolts. Use hardened bolts where required.
- .3 Replace any worn bearings, drive sheaves or worm shafts where required. Replace any worn or severely compressed isolation pads.
- .4 Reduce backlash and vibration to a minimum to suit manufacturers tolerance. Provide new worm and gear if minimum clearances cannot be obtained.

Geared Traction Machine - cont'd

- .5 Remove gear oil, flush out machine and fill with new oil to proper level. Seal all oil leaks. Provide new gaskets, seals and gland packing.
- .6 Dismantle the existing brake, and if necessary, replace the brake cores, brake coils and brake shoes. Rebush the brake bearing points where required and replace any worn pins. Refurbish to new condition.
- .7 After brake spring has been adjusted for correct tension drill the brake spring nuts and rod and insert a cotter pin to minimize the possibility of future incorrect brake adjustment.
- .8 Provide a brake setting data plate to code requirements.
- .9 Thoroughly wash off machine and bedplate. Paint equipment with machinery enamel. Paint drive sheave yellow and bedplate black in colour.
- .10 When re-installing new hoist motor ensure that key-way is not worn in hoist motor shaft or brake coupling. Refurbish as required.
- .11 Provide a new reversible AC motor with high starting torque and moderate starting current, specifically designed to meet the severe loads encountered in elevator service. Provide motor with a slip specification of 5% or less.
- .12 Totally enclose motor in a cast iron shell.
- .13 Motor to conform to NEMA Standards.

2.20 INDIVIDUAL MACHINE AND OVERSPEED GOVERNOR GUARDING

- .1 Provide a removable metal guard around the geared machine as required by Section 24, 25, 75 and 76 of the OHSA requirements and CSA Standard Z432-04 - Safe Guarding of Machinery. Paint Guard Yellow.
- .2 Provide a removable metal guard around the overspeed governor. Paint guard yellow.
- .3 Securely fasten the overspeed guard to the floor with 6mm bolts.
- .4 Provide shop drawings of all elevator machine room guarding components.
- .5 Include machine guarding on the TSSA design submission as part of the modernization scope of work.

2.21 LIMIT SWITCHES

- .1 Replace all slowdown and final limit switches in the hoistway.
- .2 Provide new switches and wiring to suit speed of elevator. Switches to be silent in their operation.
- .3 Dowel final limits to brackets after final adjustment.

2.22 DIRECT CURRENT SUPPLY

- .1 Provide rectifiers to supply direct current for elevator machine brake, control and operating equipment.

2.23 VARIABLE VOLTAGE VARIABLE FREQUENCY CONTROL

- .1 Provide a variable voltage variable frequency, flux vector control system designed for a three phase AC induction motor. System to be capable of producing full torque at zero speed and shall utilize a shaft mounted position transducer to accurately measure the rotating frequency.
- .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.
- .4 Use a three-phase, full wave bridge rectifier and capacitor bank to provide a DC voltage bus for the solid-state inverter.
- .5 Use power semiconductor devices and pulse width modulation, with a carrier frequency of not less than 12 kHz, to synthesize the three-phase, variable voltage variable frequency output to operate the hoist motor in an essentially synchronous mode.
- .6 The drive shall not create excessive audible noise in the elevator motor.
- .7 Provide capability of being adjusted or programmed to achieve the required motor voltage, current, and frequency, in order to properly match the characteristics of the AC hoist motor. A.C. motor to have a slip specification of 5% or less, or a NEMA rating of "A" or "B".
- .8 Provide a heavy duty type drive, capable of delivering sufficient current required to accelerate the elevator to contract speed with rated load and be able to maintain a 180% to 200% current overload for 3 seconds and a 150% current overload for 60 seconds. Equip drive with an electronic automatic stall prevention and voltage boost to prevent nuisance tripping during load or line transient conditions.
- .9 Provide means for removing regenerated power from the drive's DC power supply during dynamic braking. This power shall be dissipated in a resistor bank, which shall be an integral part of the controller. Failure of the system to remove the regenerated power shall cause the drive's output to be removed from the hoist motor.
- .10 Provide a contactor to disconnect the hoist motor from the output of the drive unit each time the elevator stops. Monitor contactor to ensure that the elevator will not restart if the contactor has not returned to the de-energized position when the elevator stopped.
- .11 Open all power feed lines to the brake by an electro-mechanical switch. A single ground, short circuit or solid-state control failure shall not prevent the application of the brake.

Variable Voltage Variable Frequency Control - cont'd

- .12 Arrange to continuously monitor the performance of the elevator in such a way that if the car speed exceeds 0.75 m/s during inspection operation or levelling, the car shall shut down immediately. Provide manual resetting.
- .13 The system shall not require DC injection braking to control the stopping of the elevator.
- .14 Provide encoder feedback to regulate hoist motor speed. Mount encoder on the motor shaft.

2.24 TAPELESS AUTOMATIC SELF-LEVELLING FEATURE

- .1 Provide a maintenance-free tapeless self-levelling device which will automatically bring car to within 6.35 mm or better, above or below the landing sill.
- .2 Compensate for overtravel or undertravel and bring car level to landing sill.

2.25 CONTROLLERS AND CABINETS

- .1 Remove existing controller and cabinet and provide new controllers enclosed in enamelled, ventilated, sheet steel cabinets. Include hinged doors for easy access.
- .2 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
- .3 Provide electronic time delay devices which employ stable capacitors or crystals as time base.
- .4 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 grommets or similar connections.
- .5 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.

2.26 COMPUTING DEVICES

- .1 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.
- .2 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
- .3 Provide for separate regulated power supplies to serve each micro-processor system.

2.27 SELECTOR

- .1 Replace existing selector with a maintenance -free tapeless 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 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.

2.28 HOISTWAY SWITCHES

- .1 Hoistway switches shall be silent in their operation and inaudible to passengers in the car with the fan turned off.

2.29 SOLID-STATE HARDWARE

- .1 Mount solid-state devices, except for high power silicon controlled rectifiers and rectifiers, on removable printed circuit boards.
- .2 Gold plate the contact points of edge connectors.
- .3 Provide plated through holes for double sided boards.
- .4 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .5 "Patched" connections will not be accepted.
- .6 Design solid-state devices for a high load of noise immunity.
- .7 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.

2.30 CONTROL CIRCUIT GROUNDING

- .1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.

2.31 HOISTWAY DOORS

- .1 Retain existing opening sizes.
- .2 Provide at all floors, new steel plate bi-parting counterbalanced hoistway doors, with vision panel in upper door section, Construct from 2.8mm plain steel with rigid steel framing. Provide flush appearance on landing side.
- .3 Factory finish doors with one prime coat of rust resistant paint and finish with rust resistant enamel. Finish colour to match existing and suitable to the Departmental Representative.
- .4 Equip each door panel with four (4) solid precision grooved adjustable shoes.
- .5 Equip lower edge of the upper door section with asbestos neoprene fire resistive type non crushing member of 38mm thick minimum and top edge of lower door section with trucking sill designed to support the loading/class specified.

2.32 PAINTING OF DOOR FRAMES

- .1 Paint all door frames. Finish colour to be chosen and be suitable to the Departmental Representative.
- .2 Paint sill plates black in colour.
- .3 Refinish metal surfaces using the electrostatic process. Provide a finish coat using Perfection Paint Epoxy Glaze or equivalent, with a flash point of no less than 43 degrees C., lead free, and Isocyanate free.
- .4 Thoroughly clean, scuff, sand, and feather out all chips and scratches for adhesion and final finish. Chemically wash surfaces to remove grease, oil, and other contaminates.
- .5 Apply coating with CSA approved electrostatic equipment and with rated transfer efficiency at or above 97.5% to minimize over spray.
- .6 Provide a smooth finish, free of laps, sags, runs, and pin holes. Back lap all edges to achieve full coverage.
- .7 Use coating unadulterated except where manufacturer's printed instructions specify otherwise. Mix thoroughly in accordance with manufacturer's instructions and maintain sufficient agitation during application to prevent separation of ingredients.

2.33 HOISTWAY DOOR FIRE RATING

- .1 Doors 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.
- .2 Affix ULC or other acceptable agency label on doors and accessories.

2.34 HOISTWAY DOOR TRACKS, HARDWARE AND LOCKS

- .1 Provide new removable steel door tracks with adjustable trucking sill stops, and dual side tension latching.
- .2 Install tracks vertically plumb and fasten with two bolts each, at floor level.
- .3 Provide an approved interlock, and motor operated retiring cam.
- .4 Connect door sections to each other with suitable roller chain running over grooved ball bearing sheaves. Connection to the upper panel to be with malleable iron connectors and to the lower panel with cold rolled square rods with adjustable connectors.
- .5 Provide new hoistway door locking devices at all floors including all new wiring.

2.35 DOOR OPERATOR

- .1 Provide for the car gate, and hall doors, Dual two-speed door operators. Door travel shall be determined by direct drive limit switch actuation, motor speed to be controlled to minimize slam or rebound, and designed to insure full opening and full closing. An automatic stay-open feature shall be provided to assure that the hoistway door panels stay fully open.
- .2 Provide average closing speed of 0.3 m/s for each hoistway door panel and 0.6 m/s for car gate.
- .3 Provide average opening speed of no greater than 0.6 m/s and no less than 0.5 m/s.
- .4 Permit opening by hand in case of power failure.
- .5 Provide new chains and all related hardware including chains for car gate counterweights.
- .6 Provide new car gate switch and wiring.
- .7 Provide new wireless car door operator controller in machine room.

2.36 POWER DOOR OPERATION

- .1 Provide new automatic power operation of hoistway doors and car gate to fully open and close car gate by electric power simultaneously in sequence with hoistway doors.
- .2 Open hoistway doors to at least 2/3 of their travel before the car gate starts to open.
- .3 Close car gate to at least 2/3 of their travel before the hoistway doors start to close.
- .4 Provide, an audible signal on the car to sound at least five (5) seconds prior to the time the car gate starts to close, and continues until the hoistway doors are substantially closed. Provide means to adjust the sound level of the signal to between 80 dBA and 160 dBA.

Power Door Operation - cont'd

- .5 Automatically open doors when car is stopped level at the landing. Automatically close doors after last call.
- .6 At each landing furnish momentary pressure open button and continuous pressure close button in one fixture, so connected that doors cannot be operated unless car is at same landing.

2.37 CAR GATE AND TRACKS

- .1 Provide at the front of the cab, a new single section vertically sliding counter weighted steel gate constructed of 3.5mm with 38 mm diamond round wire mesh panels with channel steel frame and channel stiffeners on vertical centres.
- .2 Provide solid type guide shoes made of cast iron or with brass alloy. Design guide shoes to provide easy replacement of the units when required.
- .3 Guide gate on new steel tracks and counterbalance by weights attached by roller chains with adjustable connectors running over ball bearing sheaves.
- .4 Set steel tracks vertically plumb and secure with minimum 9.52 mm bolts spaced every 305 mm.
- .5 Enclose or design counterweight to be retained should means of suspension fail.
- .6 Provide approved type electric gate contact.
- .7 Paint with one prime coat of rust resistant paint and power coat finish. Finish colour to be suitable to the Departmental Representative.

2.38 DUAL LIGHT CURTAIN SENSOR

- .1 Provide infrared sensor beams on each side of the cab entrance.
- .2 Device to be reliable and consistent in operation, not affected by humidity or temperature changes and have inherent long term reliability with minimum maintenance.

2.39 REDUCE SPEED DOOR CLOSING

- .1 Should the doors be held open by the "Sensor Beam" for more than 20.0 seconds, or if there is a power loss to the "Sensor Beam" a buzzer shall sound and the door closing kinetic energy shall be reduced to 3.5 j. This time delay shall be adjustable between 0 and 60 seconds.

2.40 HOISTWAY ACCESS DEVICE

- .1 Provide at top and bottom landings new keyed hoistway access switches.
- .2 Locate switch in hall button fixture and engrave "Hoistway Access" with direction arrows on face plate.
- .3 Provide hoistway -door unlocking devices at all other landings. Provide access by means of a releasing chain device which is kept under a locked panel.
- .4 Remove the redundant hoistway access key switches and provide stainless steel cover plates.

2.41 HOISTWAY DOOR SILLS

- .1 Retain existing sills, check, clean and paint.

2.42 HOISTWAY DOOR ENTRANCE ASSEMBLIES

- .1 Check all entrance assemblies for proper and secure fastening to the building structure. Check for broken welds. Repair where required.
- .2 Securely fasten any loose entrance assemblies.

2.43 TOP OF CAR OPERATING DEVICE EQUIPMENT

- .1 Provide a new permanent top of car operating device. Include an alarm bell designed to operate on normal and emergency power, duplex receptacle, and work light.
- .2 In addition to the permanent device, provide a portable hand held operating fixture. Provide a sufficient length of cord to ensure safe operation from all areas of the car top. Provide means to securely store the fixture on the car top when the unit is not in use.

2.44 TOP OF CAR RAILING

- .1 Provide a standard railing around the back and sides of the car top. Construct rail of steel tubing securely fastened to the perimeter of the cab and braced. Extend the railing from the crosshead towards the front of the hoistway on both sides. Do not interfere with running or overhead clearances. Paint railing yellow in colour.
- .2 Railing to comply with TSSA Ruling Ref.No.245/10.
- .3 Isolate railing from top of cab if cab requires movement for load weighing or anti nuisance features.

2.45 ALARM BELL

- .1 Provide an alarm bell located on the car designed to operate under permanent and emergency power conditions.
- .2 Provide a duplicate alarm bell in the hoistway at the designated level.

2.46 CAR & COUNTERWEIGHT WEIGHING

- .1 As required by the TSSA CAD clause 8.7.2.15.i 1, prior to the start and at the completion of the alteration, weight the car and counterweight separately. Record both weights.
- .2 Provide Departmental Representative with a digital photo of each recorded weight a copy of the actual recorded weights.
- .3 Provide on the car top and fill in an Auxiliary Weight Data Tag.

2.47 CAB INTERIOR

- .1 General
 - .1 Retain and reuse existing cab interior, except as noted below.
- .2 Ceiling
 - .1 Retain the existing steel ceiling. Make all lights operative. Provide guards for all lights. Prepare and paint ceiling to match side walls.
- .3 Rear and Side walls
 - .1 Completely remove the rear gate, tracks and operator equipment.
 - .2 Completely remove both side walls and attachments.
 - .3 Install from the floor to the existing ceiling 1.6mm thick steel panels 406mm wide. Individual panels to be channel formed with "C" type edges to ensure adequate rigidity.
 - .4 Provide adequate means to bolt one panel to the other to ensure structural stability.
 - .5 Horizontal supports to be welded onto individual panels at bumper rail height. Provide on all non accessible walls a stainless steel bumper rail 200mm high by 6mm thick with ends returned to the walls. Top of bumper rail to be 250mm above the floor. Design rails to be removable from inside the elevator. Provide fastenings for long term durability.
 - .6 Bottom of wall panels to be bolted to a 50mm X 50mm angle iron bolted to the cab floor.
 - .7 The inside and outside dimensions of the existing cab shall be retained.
 - .8 Provide a recess in one side panel near front of cab to accommodate the new car operating panel.
 - .9 Provide metal bilingual freight elevator signage as per B44 code requirements.
 - .10 All new panels to be primed and powder coated. Colour choice by Departmental Representative.
- .4 Flooring:
 - .1 Retain the existing steel flooring. Paint black with 10mm yellow stripe across the entrance way.

2.48 CAR OPERATING PANEL

- .1 Provide one (1) new recessed operating panel with hinged stainless steel face plate. Locate new operating panel in location of existing panel.
- .2 Provide and locate all buttons in accordance with Appendix E, of the CSA-B44 Safety Code For Elevators.
- .3 Buttons to be of stainless steel, vandal resistant design. Provide tactile plates permanently attached by means of rivets or other approved fastenings to the left of each button; use international symbol for "Main Floor" level. All other markings to be engraved on the faceplate. Attached plates will not be accepted.
- .4 The common devices to be included are as follows:
 - .1 Floor push buttons with integral illumination using minimum 100,000 hour rated blue LED illuminators. Illuminate button and provide momentary audible signal when call is registered and extinguish the call when the car stops at the selected floor.
 - .2 Alarm, stop **button**, door open, and door close buttons. Mark buttons with appropriate symbols. Properly identify stop button as "Pull to Stop" --- "Push to Run".
 - .3 Lens for Emergency Lighting as specified elsewhere.
 - .4 Perforation holes for a hands free communication system, as specified elsewhere in these specifications. Beside the phone button, provide a Yellow International Telephone Symbol and Yellow engraved bilingual wording "PHONE". Button to be located at 1220 mm above the floor.
- .5 The common devices to be included are as follows:
 - .1 A digital car position indicator, in the car station, using minimum 100,000 hour rated blue LED illuminators. Ensure bright and even illumination.
 - .2 Display letters and numbers at least 50 mm high.
 - .3 Letters and numbers to indicate the position corresponding to the landing through which the car is passing or at which it is stopped.
 - .4 Firefighter's Emergency Operation Panel.
 - .5 Provide key switches, appropriately marked by wording or symbols, to control the following:
 - .1 Car Lights.
 - .2 Test button for emergency lighting
 - .3 Independent service switch.
 - .4 Inspection Operation.
- .6 Engrave the following on the operating panel.
 - .1 Elevator I. D. Number 6 in minimum 50 mm numerals.
 - .2 Elevator Capacity in Kilograms
 - .3 TSSA Installation Number and Logo.
- .7 Submit samples of buttons and layout drawing to Departmental Representative for approval.

2.49 CAR POSITION INDICATOR

- .1 Provide a new digital car position indicator forming part of the car operating station and located at the top of the car operating station. Indicators to display identical markings to car operating buttons, including bilingual markings for main and basement floors.
- .2 Provide an audible signal to sound when the car stops at or passes a floor. Signal volume to be adjustable between 50 and 70 dBA.
- .3 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels.

2.50 HALL BUTTONS

- .1 Provide new extended stainless steel vandal resistant hall buttons similar design as car buttons incorporating minimum 100,000 hour rated blue LED illuminators. Locate centre line of new buttons to be approximately 1016mm above the floor.
- .2 Provide at all floors, a spring return key switch in the hall button fixture to restrict the use of the call buttons. The key switch will be used to call the elevator to the desired floor. Provide a quality key switch for long term operation.
- .3 Illuminate UP or Down call button when call is registered. Extinguish illumination when call has been answered.
- .4 Provide door "Open" and door "Close" buttons so connected to operate only when car is stopped level at the floor where the buttons are located.
- .5 Incorporate into the Designated Level hall button station the key switch and LED pilot light as specified under "Firefighter's Emergency Operation". Provide an emergency power indicator light and all engraving as required for emergency power operation.
- .6 Provide an out of service indicator light minimum 75mm diameter in each fixture. Include an out of service toggle switch at controller. Out of service indicator is to illuminate any time service is denied to the hall buttons.
- .7 Provide a digital position indicator in each fixture. Display floor numbers minimum 50mm high.
- .8 Provide in the hall button fixture at the main floor a designated switch with appropriate indicator lights.
- .9 The key switch shall be a (three 3 position RESET- OFF- ON) for the Fire Recall service. Provide quality type key switch of the Group 3 classification.
- .10 Provide on each hall button fixture cover a bilingual Elevator Corridor Call Station Pictograph as per Figure 2.27.9 of the B44 Code.
- .11 Provide all cutting and patching as required.

2.51 SIGNAL ILLUMINATION

- .1 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.

2.52 FACEPLATE FASTENINGS

- .1 Fasten all stainless steel signal fixture face plates securely with unexposed fasteners or with tamper-proof fasteners.

2.53 CAR EMERGENCY LIGHTING

- .1 Provide new battery operated emergency lighting equipment. The lens is to be incorporated into the car operating panel.
- .2 Provide general illumination in the car with a minimum of 2 lx intensity 1200mm above the car floor and 300mm in front of the operating panels for at least a four (4) hour period.
- .3 Include means for convenient manual operation and testing of the unit in the car station. Arrange test button to turn off normal lighting when testing emergency lighting.

2.54 AUDIBLE & VERBAL FLOOR ANNOUNCEMENT

- .1 Provide verbal floor announcement as per clause E9.3 of the B44 Code.
- .2 Provide and install a digitally controlled voice synthesizer for various messages in French and English.
- .3 The voice synthesizer should include the following messages, in English and followed in French.
 - .1 Floor served
 - .2 Direction of travel of car
 - .3 "This elevator is on special service. Please exit the elevator when the doors open"
 - .4 "Please exit the car"
 - .5 "Please allow the doors to close"
- .4 Announcement of floor and direction will be made when a car answers a car or a landing call prior to door opening operation.
- .5 Elevator related emergency messages will be announced whenever the elevator goes on a particular special operation.

2.55 ELEVATOR REMOTE MONITORING SYSTEM

- .1 Refer to Clause 2.65 of Section 14 20 06.

2.56 SECURITY CONTROL ROOM

- .1 Refer to Clause 2.67 of Section 14 20 06.

2.57 SECURITY GUARD DESK

- .1 Refer to Clause 2.68 of Section 14 20 06.

2.58 EMERGENCY COMMUNICATIONS SYSTEM IN THE CAR

- .1 Provide a hands free, vandal resistant, emergency communications device containing an internal adjustable volume control speaker and microphone, mounted on a hinged and locked panel in the car station to enable two-way voice communication between the car and a location in the building that is readily accessible to authorized and emergency personnel.
- .2 The device shall be activated by pressing the PHONE button located 1220mm above the floor in the car station and shall automatically ring a telephone number of the Departmental Representative's choice. Once activated in the elevator the line shall remain open until disconnected by the receiver.
- .3 Provide one Red LED to flash as the auto-dialler dials out. Engrave beside the Red indicator "call in progress".
- .4 Provide one Green LED to illuminate when the call has been connected. Engrave beside the Green indicator "call acknowledged".
- .5 The line dialler network shall operate on any dedicated phone line along with conventional phones and shall have an internal battery for memory back-up for a minimum of two hours in the event that power fails or the dialler is removed from the telephone line.
- .6 The device shall contain a ring sensor which shall allow the initiation of a call to the elevator. The number of rings shall be adjustable. The two-way communication shall not be transmitted to an automatic answering system.
- .7 The two-way communications, once established, shall be disconnected only when authorized personnel outside the car terminate the call.
- .8 The two-way communications means shall provide on demand to authorized personnel, information that identifies the building location and elevator number and that assistance is required.
- .9 Provide all wiring and phone lines, necessary for the complete installation of the system from the device in the elevator to an externally located terminal in the elevator machine room. Connect to the telephone line.
- .10 Supply, install and connect all the necessary wiring and equipment as required for a complete and operational intercommunication system.
- .11 The two-way communications means shall not use a handset in the car.

Emergency Communications System in the Car - cont'd

- .12 If the emergency communication means is connected to the building power supply, it shall automatically transfer to a source of standby or emergency power as required by the applicable building code, after the normal power fails. The power source shall be capable of providing for illumination of the visual indication within the car, and the means of emergency communications for at least 4 hours; and the audible signaling device for at least 1 hour.

2.59 EMERGENCY COMMUNICATIONS SYSTEM IN THE CAR VERIFICATION

- .1 Comply with Clause 2.27.1.1.6 of the B44 Code.
- .2 Provide a minimum of one illuminated visual and audible signal for each group of elevators controlled by the Fire Recall Switch. Provide a stainless steel faceplate.
- .3 The visual signal is to be located at the designated landing in the vicinity of the Fire Recall Switch.
- .4 Provide all Bilingual engraving as required.

2.60 INTERCOM SYSTEM

- .1 Refer to Clause 2.72 of Section 14 20 06.

2.61 BILINGUAL MARKINGS

- .1 Engrave identification and instructions at least 0.25 mm deep on operating panels and on all signal equipment in both English and French except where design is such that inference is obvious and readily understood. All floor markings for car and hall indicators to be bilingual.
- .2 All engraving to be English first, followed by French.

2.62 KEYS

- .1 Provide six (6) sets of keys for each control device and for Special Emergency Service. Provide twelve (12) keys for the hall button restricted call operation.
- .2 Organize keys on suitable key rings with permanently engraved tags, clearly identifying use. Tags to be approved by Departmental Representative.
- .3 All keys shall be grouped as per the B44 Code.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND PROCEDURE

- .1 Install all equipment in a first class workmanship manner. Upon completion do all necessary repairs, cleaning, and painting as required to turn the equipment over in "New Condition".

3.2 ARRANGEMENT OF EQUIPMENT

- .1 Arrange equipment in machine room so that rotating elements, sheaves and other equipment can be removed for repairs or replacement without dismantling or removing other equipment components.
- .2 Arrange equipment for clear passage.
- .3 Arrange equipment according to machine room layout.
- .4 Accommodate equipment in provided space according to above mentioned requirements.

3.3 WELDING

- .1 All field welds shall be identified with the welder's identification stamp.

3.4 SURFACE PROTECTION

- .1 Provide protective coverings for finished surfaces.

3.5 LIMIT SWITCHES

- .1 Subsequent to the performance of safety tests and checks by the Inspecting Authorities, fasten final limit switches and brackets by through bolting or dowelling.

3.6 BRAKE

- .1 Adjust brake to hold car cab plus 125% of the rated load.
- .2 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
- .3 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.
- .4 Provide and fill out brake setting data plate after final adjusting.

3.7 CAR BALANCE

- .1 Check the static balance of the car.

3.8 COUNTERWEIGHT BALANCE

- .1 Check the static balance of the counterweight.
- .2 Adjust the equipment and all guide shoes so that at any point the pressure upon the guides does not exceed 11 kg.
- .3 Check and adjust as required to ensure that the counterweight is equal to the complete elevator cab plus between 40 to 42.5% of the contract load.

3.9 SPEED VARIATION

- .1 Adjust for speed variation as follows:
 - .1 When lifting rated load, do not permit car speed to vary from rated speed by more than 2%.
 - .2 When operating under varying normal conditions, i.e. rated load to no load, do not permit operating conditions to exceed 2%.

3.10 OPERATING TIME

- .1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed 16.0 seconds in both directions.
- .2 Measure this time as follows:
 - .1 The time starts when the fully opened doors begin to close and continues until the car is stopped level with the next floor and the car and hall doors are open to three-quarters of their fully open position.
 - .2 Floor level is considered to be within 6.35 mm of level.
 - .3 The time is measured with full load in the car and in both directions of travel.
 - .4 The power door operation for the hall and car doors conforms to the elevator safety code requirements.
 - .5 Adjust the equipment so that for other conditions of loading, the time does not vary more than five percent (5%).
 - .6 The car call dwell time is to be initially set at between 4.0 to 5.0 seconds.
 - .7 The hall dwell time is to be initially set at between 5.0 to 6.0 seconds.
 - .8 Adjust the equipment so that the operating time, as set out above, is compatible with dependable, consistent operation without undue wear or excessive maintenance and can be readily maintained over the life of the elevator installation.
 - .9 Adjust the equipment so that with the control adjusted to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride to the freight handlers.

3.11 RIDE PERFORMANCE

- .1 Acceleration/Deceleration
 - .1 Adjust the equipment to allow the car to start, accelerate, decelerate and stop smoothly.
 - .2 Adjust rate of acceleration to between 1.0 and 1.1 m/s².
- .2 Jerk
 - .1 Adjust the change in the rate of acceleration and deceleration (jerk) to not exceed 2.5 m/s².

3.12 COMMISSIONING PLAN

- .1 Responsibilities
 - .1 Various responsibilities of the commissioning process are as follows:
 - .1 The Departmental Representative is responsible for overall coordination of commissioning activities review and approval of all documentation, overview of performance, verification activities, verification of the accuracy of all reported results.
 - .2 Departmental Representative - overall responsibility for witnessing and certification of the performance of commissioning activities.
 - .3 Contractor - overall responsibility for performance of all commissioning activities and recording of all results.
- .2 Commissioning Schedule
 - .1 The Contractor will be responsible for providing a schedule for commissioning which is to include the following milestones: start-up, training, delivery of O&M Manuals, schedule, and sequencing of commissioning, acceptance, occupancy.
 - .2 Commission all components, systems, and integrated systems in accordance with the requirements of Section 01 91 13 General Commissioning (Cx) Requirements.

3.13 INSPECTIONS FIELD TESTS AND COMMISSIONING

- .1 Furnish a competent personnel to assist the Departmental Representative during the inspection and testing of the systems. Make the appropriate corrections until final acceptance of the installations.
- .2 The inspections will be carried out to ensure that the workmanship is in compliance with plans and specifications.
- .3 Provide one weeks notice for testing. Prior to giving notice the Contractor shall test all systems to ensure proper operation.
- .4 Perform all tests as required by the B44 Code.
- .5 Upon completion of the elevator provide all personnel, instruments and devices required to perform the following:
 - .1 Test car and counterweight balance to verify specification requirements.
 - .2 Test the equipment under full load and no load to verify the speed variation performance requirements.
 - .3 Upon completion of the elevator furnish competent technicians, adjusters or engineers fully trained on the equipment installed to check and test all operating systems including but not limited to, emergency power operation, special emergency service and in car communication system.

3.14 NOTIFICATION TO DEPARTMENTAL REPRESENTATIVE

- .1 The Departmental Representative will periodically inspect the work, but is to be notified specifically for the following:
 - .1 One week prior to commencement of work
 - .2 On delivery of material to the site
 - .3 One week prior to TSSA Inspection
 - .4 On completion of all deficiencies

3.15 TEST DATA FORMS

- .1 After completion of the work on the elevator, complete and submit to the Departmental Representative the following form.

Elevator No.	
CAR SPEED UP (fpm)	
CAR SPEED DOWN (fpm)	
FLOOR TO FLOOR TIME UP (seconds)	
FLOOR TO FLOOR TIME DOWN (seconds)	
BRAKE TO BRAKE TIME UP (seconds)	
BRAKE TO BRAKE TIME DOWN (seconds)	
EMPTY CAR - RUNNING CURRENT UP (amps)	
EMPTY CAR - RUNNING CURRENT DOWN (amps)	
FULL LOAD - RUNNING CURRENT UP (amps)	
FULL LOAD - RUNNING CURRENT DOWN (amps)	
CAR DOOR OPEN TIME (seconds)	
CAR DOOR CLOSE TIME (seconds)	
CAR CALL DWELL TIME (seconds)	
HALL CALL DWELL TIME (seconds)	
NUDGING TIME OUT (seconds)	
LEVELLING ACCURACY (")	
TYPE OF DOORS	
SAFETY SLIDE DISTANCE (inches)	
GOVERNOR OVERSPEED SWITCH TRIP (fpm)	
SAFETY APPLICATION TRIP SPEED (fpm)	
ACCELERATION RATE (G force)	
DECELERATION RATE (G force)	
JERK RATE (G force)	
TESTS PERFORMED BY:	DATE:

- .2 These forms shall be signed by the person responsible for the performance of the work.

3.16 CLEANING AND PAINTING

- .1 Upon completion thoroughly clean, remove all indications of rust and paint the following in accordance with Section 09 91 23.01 - Interior Re-painting. Use only Low Odour paint.
 - .1 Machine room, secondary level, and pit floor. Use grey floor paint.
 - .2 Car top grey. Crosshead in rust resistant black paint.
 - .3 Counterweight frame and blocks in rust resistant yellow paint
 - .4 Counterweight auxiliary guides in yellow
 - .5 Car and counterweight buffer channels in rust resistant black paint
 - .6 Paint counterweight guard black
 - .7 Horizontal area of the refuge space in the pit
 - .8 Pit ladder - yellow in colour
 - .9 Paint the hoisting beam yellow in colour
 - .10 Safety Railing on car top - yellow in colour
 - .11 Paint complete machine green, and bedplate black. Use machinery paint
 - .12 Paint all machine and secondary level guarding Yellow

END OF SECTION

PART 1 - GENERAL**1.1 RELATED SECTIONS**

- | | | |
|-----|---------------------|--|
| .1 | Section 01 00 10 | General Instructions |
| .2 | Section 01 14 25 | Designated Substances Report |
| .3 | Section 01 32 16.07 | Construction Progress Schedule - Bar (GANTT) Chart |
| .4 | Section 01 33 00 | Submittal Procedures |
| .5 | Section 01 35 29.06 | Health and Safety Requirements |
| .6 | Section 01 78 00 | Closeout Submittals |
| .7 | Section 01 91 13 | General Commissioning (Cx) Requirements |
| .8 | Section 09 91 23.01 | Interior Re-painting |
| .9 | Section 23 05 00 | Common Work Results for HVAC |
| .10 | Section 26 05 00 | Common Work Results - Electrical |
| .11 | Section 26 05 20 | Wire and Box Connectors (0 - 1000 V) |
| .12 | Section 26 05 21 | Wire and Cables (0 - 1000 V) |

1.2 DESCRIPTION OF SYSTEMS - LOW RISE

- .1 The characteristics of the existing Duplex geared passenger elevators are as follows:
- | | |
|-----------------------------|--|
| Elevator No's.: | 1 - 2 |
| Original Manufacturer: | Otis Elevator |
| TSSA Installation No's | 10787 & 10788 |
| Machine Type : | Otis # 2 SWT Geared |
| Drive Type: | Motor generator |
| Control Type Relay Based: | Otis 23 UCL |
| Rated Speed: | Retain 1.78m/s |
| Rated Capacity: | Retain 1363 kg |
| Existing Car Door Operator: | Otis 6970 |
| Car Door Protection: | Multi-Beam Detector |
| Door Type: | Center Opening |
| Door Size: | 1066 mm x 2135 mm |
| Floors Served | Elevator #1-5
Elevator#2-6 |
| Type of Operation: | Duplex Selective Collective Automatic |
| Car Operating Panels: | Provide Two (2) per elevator |
| Life Safety Features: | Automatic Firefighter's Emergency Operation
Phase I and II
Emergency Power Operation |

Description of Systems - Low Rise - cont'd

- .2 The characteristics of the existing Triplex geared passenger elevators are as follows:

Elevator No's.:	3 - 5
Original Manufacturer:	Otis Elevator
TSSA Installation No.s	10790 -10791-10792
Machine Type :	Otis # 2 SWT Geared
Drive Type:	Motor generator
Control Type Relay Based:	Otis 21 AU2
Rated Speed:	Retain 1.78m/s
Rated Capacity:	Retain 1363 kg
Existing Car Door Operator:	Otis 6970
Car Door Protection:	Multi-Beam Detector
Door Type:	Center Opening
Door Size:	1066 mm x 2135 mm
Floors Served	Elevators No. 3 & 4 5 floors Elevator No. 5 6 floors
Type of Operation:	Triplex Selective Collective Automatic
Car Operating Panels:	Two (2) per elevator
Life Safety Features:	Automatic Firefighter's Emergency Operation Phase I and II Emergency Power Operation

1.3 DESCRIPTION OF WORK

- .1 This Section covers the engineering, fabrication, and modernization of Five Geared Low Rise Passenger Elevators located at 875 Heron Road.
- .2 Before the execution of the work, verify all dimensions with actual site conditions. All new equipment to be designed to meet existing space provisions.
- .3 Provide all materials, labour, design, manufacturing, inspection, and testing as required to complete the work as specified in these Contract Documents.
- .4 Commission all components, systems, and integrated systems in accordance with the requirements of Division 1.
- .5 Arrange and pay for all permits, certificates, inspections, and tests required by the governing authorities, including TSSA Design Submissions and initial and follow-up inspections.
- .6 Where a device or component is mentioned in the singular number, such references shall be understood to mean that this Section shall provide as many of said devices or components as is necessary for the completion of the elevator covered under this Section.

Description of Work - cont'd

- .7 All equipment being replaced shall become the property of this Section, and as such, it is the responsibility of this section to remove it from the premises in a prompt and orderly manner.
- .8 Include all related building work required to complete the modernization of the elevators.
 - .1 Machine Room
 - .1 Patch with cement, all redundant holes in machine room floor resulting from the removal of redundant elevator equipment.
 - .2 Provide coordination, wiring, and connections from the controller to the emergency power transfer switch for the emergency power and pre-transfer signals.
 - .3 Provide a Code Data Tag on controller as per clause 8.9.1 of the B44 Code.
 - .4 Provide a permanent sign in elevator machine room indicating the specified temperature and humidity range requirements for the elevator equipment to ensure safe and normal elevator operation.
 - .5 Provide a removable metal guard around the drive sheave and hoist ropes as required by Section 24 and 25 of OHSA requirements and CSA Standard Z432-04 - Safe Guarding of Machinery. Paint Guard Yellow.
 - .6 Paint the machine room floor. Provide two coats of Grey Enamel on floor.
 - .7 Paint the hoist beam yellow.
 - .8 Reduce the space to a minimum around the hoist cable holes in the machine room floor.
 - .9 Provide a metal drip pan under the roof drain where the drain runs above control or drive equipment.
 - .10 Provide an Alteration data plate or laminated copy of alteration data sheet on controller as per B44 Code requirements.
 - .11 Provide a licence frame holder for each elevator licence to be installed on the front of the controller door. Indicate on TSSA design submission that licences will be located in the elevator machine room.
 - .12 Provide a metal maintenance cabinet in the machine room.
 - .13 Provide a metal container complete with a lid for the storage of oily rags, redundant parts and papers etc.

Description of Work - cont'd**.2 Secondary Level**

- .1 Provide a removable metal guard around the deflector sheave as required by Section 24 and 25 of OSHA requirements and CSA Standard Z432-04 - Safe Guarding of Machinery. Paint Guard Yellow.
- .2 Provide a new positive action stop switch for each elevator. Provide red operating handle or push button. Identify Stop and Run position. Number the stop switch to correspond to the appropriate elevator.
- .3 Provide new and safe access to the secondary level as described in the Architectural Drawings.
- .4 Paint the concrete secondary level floor. Provide two coats of Grey Enamel on floor.

.3 Car Top

- .1 Provide updated crosshead data plate on car top as per code requirements indicating the year of the modernization and the Contractors name. Retain existing crosshead data plates.
- .2 Paint the elevator number on the crosshead minimum 50mm high.
- .3 Provide two (2) permanent guarded lights on car top. One light to be a moveable type with a magnetic base.
- .4 Modify the existing metal safety railing on the car top to comply with TSSA Ruling Reference No. 245/10. Ensure that the kick plate fits flush to car top.
- .5 Paint the TSSA installation number on the crosshead minimum 50mm high.
- .6 Provide a cab alteration data plate on car top.
- .7 Legibly and completely fill in and install the hoist and governor rope tags on the car top.

.4 Hoistway

- .1 Thoroughly clean down hoistway at completion of work.
- .2 Bevel all projections in the hoistway that protrude more than 100mm.
- .3 Provide hoarding in the hoistway as per clause 11.1 of Part III of the Current TSSA Elevating Devices Code Adoption Document.
- .4 Provide a green or bare copper ground wire from the hoist cables to the crosshead and counterweight frame. Provide secure connections at both ends.
- .5 Run all new telephone, communication, elevator security and fire alarm lines and conduit in the hoistway and to the machine room. Others will run lines to the hoistway and provide sufficient wiring to reach machine room. Elevator Contractor to supply and install the conduit in the hoistway. All fire alarm wiring must be run in a separate conduit.

Description of Work - cont'd

- .5 Pit
 - .1 For non walk in pits provide permanent hoistway door auxiliary unlocking devices in pit as per B44 Code requirements.
 - .2 For elevator No.2 extend pit ladder to 1524mm above sill where access to the pit is from the bottom floor hoistway door.
 - .3 Provide a permanent runby sign in the pit in close proximity to the counterweight buffer or buffer stand.
 - .4 For the walk in pits, locate the pit switch beside the pit entrance door jamb.
 - .5 Paint pit ladder Yellow in colour.
 - .6 Paint the pit floor. Provide two coats of Grey Enamel on floor.

1.4 REFERENCE STANDARDS

- .1 Comply with all building codes, by-laws, regulations, directives, and ordinances as set forth and mandated by Federal, Provincial, and Municipal Authorities, in effect at the time of installation.
- .2 ASME A17.1-2010/CSA-B44-10 Safety Code For Elevators, including latest supplements and Appendix E, Elevator Requirements For Persons with Physical Disabilities.
- .3 Technical Standards And Safety Act 2000 O.Reg 209/01, Elevating Devices Code Adoption Document and O.Reg.222/01 Certification and Training of Elevating Devices Mechanics.
- .4 CSAB44.2.07 - Maintenance requirements and intervals for elevators, dumbwaiters, escalators and moving walks.
- .5 CSA Standard B651-04 Accessible Design For The Built Environment.
- .6 The National Building Code Of Canada - 2005.
- .7 CAN/CSA-B44.1-11/ASME A17.5 2011 Elevator and Escalator Electrical Equipment.
- .8 CSA Standard Z432-04 - Safe Guarding of Machinery.
- .9 CSA Standard C22.1 - 09 Canadian Electrical Code Part 1. Section 38.
- .10 The latest copy of the TSSA Code Adoption Document.

1.5 DEFINITIONS OF TERMS

- .1 All terms in the specifications that are not otherwise defined shall have the definitions as given in the B44 Safety Code For Elevators.
- .2 The term “refurbish”, shall mean to carry out all labour, painting or modifications to parts, etc, which will result in returning the original component to a “like new” condition.
- .3 Where the terms “furnish” or “provide” are used, it shall mean to supply and install new equipment.

1.6 DUPLEX SELECTIVE COLLECTIVE OPERATION

- .1 General Operation: For Elevators Number 1 & 2.
- .2 Provide a micro-processor based duplex selective control system.
- .3 Provide one riser of hall buttons. Install single hall buttons at each terminal floor and UP and DOWN buttons at each intermediate floor with stainless steel faceplates.
- .4 Park one car at main floor and park free car, at floor last served.
- .5 Arrange free car to answer hall calls either above or below landing at which car is standing except main floor and basement hall calls.
- .6 When free car is clearing calls, automatically start the other car to answer hall calls under any of following conditions:
 - .1 Registration of UP calls from landing below free car while it is travelling UP.
 - .2 Registration of UP or DOWN call from landing above free car while it is travelling DOWN.
 - .3 When free car is unable to clear all registered hall calls within approximately 40 s.
- .7 Schedule each car so that momentary pressure of one or more of car buttons causes car to start.
- .8 When started, either in response to car calls or to hall calls, respond to calls registered for direction in which car is travelling in the order which landing are reached, regardless of sequence in which calls were registered.
- .9 Allow only one car to stop in response to any one hall call.
- .10 Return first car to clear its calls, to main floor.
- .11 Should both cars finish their calls at main floor, designate one car as free car.
- .12 If car buttons are not pressed and car starts UP in response to several DOWN calls, proceed to highest DOWN call and reverse to answer other DOWN calls. Answer UP calls similarly when car starts DOWN in response to such calls.

Duplex Selective Collective Operation - cont'd

- .13 If car stops for hall call and car call is registered within predetermined interval after stop for landing corresponding to direction car was travelling, proceed in same direction regardless of other hall calls registered.
- .14 If DOWN hall calls are registered while car is travelling UP do not stop at these landings, but allow these calls to remain registered.
- .15 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
- .16 When travelling DOWN do not respond to UP calls but allow these to remain registered, and be answered by another car on an UP trip.
- .17 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for preset 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.
- .18 Permit registered car call to establish direction of travel when car has answered farthest call, even if other hall calls are registered.
- .19 Answer calls to basement from car normally parked at main floor unless free car is at the basement.
- .20 If one car is removed from service, arrange for other car to answer own car calls as well as all hall calls.
- .21 Back-up Dispatching
 - .1 In the event of a loss of hall button service, automatically initiate hall calls for all floors.
 - .2 In the event of a dispatcher processor failure or loss of power to the dispatcher, automatically transfer cars to respond to an existing programmed format. Detect failures and initiate back-up by circuitry independent of the microprocessor.
 - .3 Existing emergency recall and emergency power operation to remain operative on the operating elevator.

1.7 TRIPLEX SELECTIVE COLLECTIVE OPERATION

- .1 General Operation: For Elevators Number 3-4-5.
- .2 Provide a micro-processor based triplex selective control system.
- .3 Provide two risers of hall buttons. Install single hall buttons at each terminal floor and UP and DOWN buttons at each intermediate floor with stainless steel faceplates.
- .4 Park one car at main floor, designate other cars as free cars and park one free car in lower half of hoistway, and the other free car in upper half of hoistway.

Triplex Selective Collective Operation - cont'd

- .5 Arrange closest free car to answer hall calls either above or below landing at which car is standing except main floor and basement hall calls.
- .6 When one free car is clearing calls, automatically start the other free car to answer hall calls under any of following conditions:
 - .1 Registration of UP calls from landing below free car while it is travelling UP.
 - .2 Registration of UP or DOWN call from landing above free car while it is travelling DOWN.
 - .3 When free car is unable to clear all registered hall calls within approximately 40s.
- .7 Schedule each car so that momentary pressure of one or more of car buttons causes car to start.
- .8 When started, either in response to car calls or to hall calls, respond to calls registered for direction in which car is travelling in the order which landing are reached, regardless of sequence in which calls were registered.
- .9 Allow only one car to stop in response to any one hall call.
- .10 Return first car to clear its calls, to main floor.
- .11 Should all cars finish their calls at main floor, designate two cars as free cars.
- .12 If car buttons are not pressed and car starts UP in response to several DOWN calls, proceed to highest DOWN call and reverse to answer other DOWN calls. Answer UP calls similarly when car starts DOWN in response to such calls.
- .13 If car stops for hall call and car call is registered within predetermined interval after stop for landing corresponding to direction car was travelling, proceed in same direction regardless of other hall calls registered.
- .14 If DOWN hall calls are registered while car is travelling UP do not stop at these landings, but allow these calls to remain registered.
- .15 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
- .16 When travelling DOWN do not respond to UP calls but allow these to remain registered, and be answered by another car on an UP trip.
- .17 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for preset interval at landings where stops are made. Time delays to be adjustable from 0 to 60 seconds. Cancel interval upon registration of car call or pressure on door close button.
- .18 Permit registered car call to establish direction of travel when car has answered farthest call, even if other hall calls are registered.

Triplex Selective Collective Operation - cont'd

- .19 Answer calls to basement from car normally parked at main floor unless free car is at the basement.
- .20 If one car is removed from service, arrange for other cars to answer own car calls as well as all hall calls.
- .21 Back-up Dispatching
 - .1 In the event of a loss of hall button service, automatically initiate hall calls for all floors.
 - .2 In the event of a dispatcher processor failure or loss of power to the dispatcher, automatically transfer cars to respond to an existing programmed format. Detect failures and initiate back-up by circuitry independent of the microprocessor.
- .22 Existing emergency recall and emergency power operation to remain operative on all operating cars.
- .23 Cross Registration / Overlay Feature
 - .1 Provide a cross registration / overlay feature for the dispatching that requires the new group controller to accept the assignment of all hall calls. If one of the modernized cars cannot respond to a hall call within an adjustable ETA, the hall call is then re-assigned to the existing group controller.
 - .2 Before the first elevator is removed from the group operation for modernization, demonstrate the operation of the cross registration feature to the Departmental Representative. For demonstration purposes, temporarily remove one car from the group, the two remaining cars are to operate as a group answering all hall calls in an acceptable manner. Do not remove the first elevator for modernization until the cross registration system has been approved by the Departmental Representative.

1.8 NEXT FLOOR EMERGENCY STOP FEATURE

- .1 In the case of over speed due to maladjustment of equipment, stop elevator at next floor.

1.9 FIREFIGHTERS' EMERGENCY OPERATION

- .1 Provide automatic Alternate "Firefighters' Emergency Operation" in accordance with the CSA-B44 Elevator Safety Code and the National Building Code of Canada, including all requirements for High Buildings.
 - .1 Provide an additional key-operated "FIRE RECALL" switch with two positions marked "OFF" and "ON" in that order, at "Building Fire Control Station" only.

1.10 FIRE OPERATION PANEL

- .1 The "FIRE OPERATION" switch, the "CALL CANCEL" button, the "STOP" switch, the door open button(s), the door close button(s), the additional visual signal and the operating instructions shall be grouped together at the top of a main car operating panel behind a locked cover.
- .2 The firefighters' operation panel cover shall be openable by the same key that operates the "FIRE OPERATION" switch. The cover shall be permitted to open automatically when the car is on Phase I Emergency Recall Operation and at the recall level.
- .3 When the key is in the "FIRE OPERATION" switch, the cover shall not be capable of being closed. When closed, the cover shall be self-locking. Where rear doors are provided, buttons for both the front and rear doors shall be provided in the firefighters' operation panel. The door open and door close buttons for the rear entrance shall be labelled "OPEN REAR" and "CLOSE REAR."
- .4 All buttons and switches shall be readily accessible, located not more than 1800 mm above the floor. The front of the cover shall contain the words "FIREFIGHTERS' OPERATION" in red letters at least 10 mm high.

1.11 FIREFIGHTERS' OPERATION INSTRUCTIONS

- .1 Instructions for the operation of the elevators on Phase I Emergency Recall shall be permanently incorporated with, or adjacent to the "FIRE RECALL" switch at the designated level.
- .2 Instructions for the operation of the elevators on Phase II Emergency In-Car Operation shall be permanently incorporated on the rear of the fire panel door, in or adjacent to the operating panel in each car.
- .3 The instructions shall be in letters not less than 3mm in height and shall be permanently installed and protected against removal or defacement.

1.12 FIREFIGHTERS' EMERGENCY OPERATION KEY - FEO-K1

- .1 Provide a standard firefighters' operation key (FEO-K1).
- .2 The key shall be of a tubular type, 7-pin, style 137 construction and have a biting code of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key.
- .3 The same FEO-K1 key shall operate the elevator emergency power selector switch when provided, the fire recall switch and fire operation panel door.
- .4 The keyswitches shall be of the Group 3 Security.

1.13 ELEVATOR IDENTIFICATION

- .1 Provide 100mm numerals corresponding to floor level on inside of hoistway doors and fascia plates.
- .2 Provide 50mm numerals on all elevator equipment in machine room and pit. Include permanent numbers engraved in each elevator.
- .3 Provide all necessary engraving on faceplates as required by the Departmental Representative, in English and French, Helvetica medium, upper and lower case.
- .4 All fastenings of cover plates for signals, buttons and panels shall be tamper proof type.
- .5 Identify all elevators at designated level floor. Use metal plates permanently installed with rivets or a permanent type glue. Numbers to be minimum 50mm high.
- .6 Provide raised character and braille floor designations on both door jambs minimum size 50mm. Locate centre-line of numeral 1525 mm above floor level measured from the base line of the characters.
- .7 At the main entry level on both door jambs provide a 50mm raised star designation to the left of the floor designation number. All characters to comply with Clause E-17.
- .8 Provide on each floor hall button cover plate, bilingual, Elevator Corridor Call Station Pictograph as per Figure 2.27.9 of B44 Code.
- .9 Provide 50mm elevator identification number on machine and governor guards in the machine room and the secondary level guards.
- .10 Identify all Firefighters Elevators at designated level with a permanent Red Hat Logo as per B44 Code requirements.

1.14 AUTOMATIC EMERGENCY POWER OPERATION

- .1 Provide Automatic Emergency Power Operation in accordance with the B44 Safety Code For Elevators. There is sufficient emergency power to operate one elevator at a time from each group.
- .2 Operating Devices:
 - .1 Provide in the elevator lobby at the designated level an LED signal light marked "ELEVATOR EMERGENCY POWER" to indicate that the emergency power is in effect.
 - .2 A signal, provided from the transfer switch, will indicate to the elevator control system, that the system is now operating on the emergency power supply.

Automatic Emergency Power Operation - cont'd

- .3 Operation:
 - .1 When the signal has been provided to the elevator controller indicating that emergency power conditions are now in effect, each elevator shall be returned to the street floor level one at a time and park with their doors open. Should an elevator fail to start for any reason, after a pre-set pause time, the system shall automatically transfer to the next elevator.
 - .2 When the signal is provided to the elevator controller that normal power conditions are now in effect each elevator shall be started one at a time.
 - .3 Transfer from emergency power to normal power will be adjustable. Design elevator control system to compensate for any power variance which may occur during transfer and automatically re-instate normal operation following stabilization of power supply.
 - .4 During testing conditions, on pre transfer to and from emergency power, arrange that the car and hoistway doors remain open at the landing for at least 20 seconds prior to transfer or until the emergency or normal power is restored.

1.15 INDEPENDENT SERVICE OPERATION

- .1 Provide independent service operation by means of a key operated switch in each elevator to allow the car to operate independently in response to car calls only.
- .2 Park the car with the doors open, and respond to a selected car call by constant pressure on the door close button, provided, that the doors have been closed and the interlock is made-up. Arrange for the doors to reopen if the constant pressure on the door close button is released at any point prior to the car starting.
- .3 Place the direction of travel under the control of the attendant. Arrange the operation to cancel all registered car calls, and by-pass registered hall calls. Do not operate hall lanterns when stopping at a floor.

1.16 ELEVATOR PERFORMANCE

- .1 Provide smooth acceleration and deceleration of car without perceptible steps so as not to cause passenger discomfort.
- .2 Comply with all performance requirements as detailed in Part 3 of this specification.

1.17 SAMPLES

- .1 Refer to Section 01 33 00 - Submittal Procedures
- .2 Submit samples for each following component for review by the Departmental Representative.
 - .1 Car and Hall operating fixtures
 - .2 Hall Position indicator fixtures

1.18 SUBMITTALS

- .1 Refer to Section 01 33 00. Submit shop drawings as required to include the following information.
- .2 Provide six (6) copies of all drawings for Departmental Representative's review.
- .3 Indicate on shop drawing the following information:
 - .1 A layout of the elevator equipment located in the machine room including all retained and new equipment complete with dimensions and weight.
 - .2 Characteristics of the equipment located in the machine room including KVA rating of transformer and heat dissipation of equipment.
 - .3 Size of wiring from the mainline disconnect switch to the transformer and controller.
 - .4 Car and hall operating fixtures and indicators details showing materials and finish.
 - .5 Hoist rope brake mounting drawings and components.
 - .6 All Firefighters and Emergency Power Operation Panels at the designated level.
 - .7 All technical information and operating instructions for the elevator communication system.
 - .8 Do not order any materials until all shop drawings are approved.

1.19 RECORD DRAWINGS

- .1 Provide record drawings as required by Section 01 78 00 - Closeout Submittals.
- .2 In addition, provide schematic wiring diagrams, including all changes made in final work, covering electrical and solid state equipment as supplied and installed, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
- .3 All changes to the wiring diagrams must be marked up in RED and stamped by a Registered Professional Engineer.
- .4 Provide a letter from a Registered Professional Engineer confirming that the marked up drawings are complete and are "as built".
- .5 Provide three (3) sets of final issue shop drawings, and three (3) copies of "as built" wiring diagrams. All drawings to be laminated.
- .6 Provide an electronic copy of final "as built" wiring diagrams and fixture drawings.

1.20 OPERATION AND MAINTENANCE MANUALS

- .1 Provide all information necessary for the safe and efficient maintenance of the equipment and incorporate into the maintenance manual as required by Section 01 78 00.
- .2 In addition to the requirements of Section 01 78 00, the maintenance data must include the following information:
 - .1 Description of system's method of lubrication, operation and control including, video monitor, motor control system, door operation, signals, fire-fighter's service, emergency power operation, and special or non-standard features provided.
 - .2 As built schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
 - .3 Copies of the TSSA registered design submissions.
 - .4 Copies of TSSA initial and final inspection reports.
 - .5 Signed copy of the Warranty Letter.
 - .6 Parts catalogue giving complete list of repair and replacement parts with cuts and identifying numbers.
 - .7 All technical information and operating instructions for the elevator and communication system.
- .3 Maintenance: Use clear drawings, diagrams or manufacturer's literature which specifically apply and detail the following:
 - .1 Lubrication products and schedules
 - .2 Troubleshooting procedures
 - .3 Adjustment techniques
 - .4 Operational checks
 - .5 Maintenance of special finishes
 - .6 Planned maintenance tasks and their frequencies
- .4 Equipment: Information of each piece of equipment will be assembled in the following order. Equipment details such as:
 - .1 Approval drawing number
 - .2 Model, part and serial number

Operation and Maintenance Manuals - cont'd

- .5 Spare Parts:
 - .1 List of recommended spares to be maintained on site to ensure optimum efficiency
 - .2 List of all special tools and appropriate unique applications
 - .3 Detail manufacturer and supplier names and addresses
 - .4 All equipment is to be listed as to types
 - .5 The Contractor is to permanently attach any service or diagnostic tool access code numbers to each controller at the completion of the project. Any special tools, hand held devices, computers etc. required for the operation, testing, adjusting or setting parameters for the controller or car door operator must be left on-site in the machine room.
- .6 Maintenance Control Program:
 - .1 Provide with the O & M manuals a copy of the approved maintenance control program for the elevators.

1.21 EQUIPMENT RE-ADJUSTING & RUN-IN PERIOD

- .1 The Elevator Contractor is to completely re-adjust the elevator control, selectors, drive equipment and car door operators to ensure reliable and consistent elevator operation during the modernization period.
- .2 All hoistway door locks and closing devices to be checked and adjusted to provide reliable door operation.
- .3 The above re-adjusting work is to be carried out before the first elevator from each group is removed from service for the modernization.
- .4 The Elevator Contractor is to submit to the Departmental Representative copies of the time tickets confirming the above work has been carried out on each elevator.
- .5 Provide a two day run-in period on each modernized elevator before the elevator is turned over for passenger use. During this two day run-in period the Elevator Contractor is closely monitor the elevator operation and correct any deficiencies or problems that might occur during this period.

1.22 MAINTENANCE SERVICE UNDER THIS CONTRACT

- .1 Include full maintenance service as described below, for the elevators from the time of contract award until the issuance of the Final Certificate of Completion of the modernization project.
- .2 The Long Term PWGSC maintenance contract, which forms part of the combined bid, will commence one month after the issuance of the Final Certificate of Completion of the modernization project.
- .3 Perform all Tests and Examinations as required by CAD Section 8.6. The CSA-B44 Safety Code For Elevators, including any Supplements and the B44.2-07 Code. The frequencies specified in the B44.2-07 Code are a minimum. Should on-site conditions or manufacturers recommendations require more frequent procedures they shall be increased accordingly.
- .4 Maintenance to include semi-monthly systematic examination, cleaning, adjustment and lubrication of elevator equipment and the repair or replacement of all defective parts due to normal wear and tear. Do not remove elevators from service during peak traffic periods. Use only genuine parts produced by the manufacturer of the equipment.
- .5 Provide a minimum of three (3) hours of preventive maintenance per maintenance inspection.
- .6 Provide call back service 24 hours per day, seven (7) days per week during regular working hours, and the release of trapped persons at any hour, at no extra charge. The response time to remove trapped passengers during regular working hours shall be no longer than 30 minutes and no longer than 60 minutes after hours.
- .7 During the construction period, if any of the operating elevators stop, or a passenger becomes trapped in an elevator, the on-site construction mechanic must immediately remove the trapped passenger and return the elevator to service if possible.
- .8 Maintain on site an adequate stock of parts for replacement or emergency purposes. Have qualified personnel under the supervision and in the direct employ of the Contractor available to ensure fulfilment of this maintenance service without unreasonable loss of time.
- .9 Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Departmental Representative.
- .10 Maintain in the elevator machine room one (1) copy of the schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus. Laminate all wiring diagrams.
- .11 Provide a permanent log for each elevator with pre-numbered pages having the following information: date, time, regular maintenance, regular and overtime call back, names of maintenance technician, action taken, work completed and additional repairs required.

Maintenance Service Under This Contract - cont'd

- .12 The log - which is part of the maintenance control program - shall be the property of the Departmental Representative and shall be kept on the job site and available at all time for the Departmental Representative's verification.
- .13 Make all entries in ink, legibly, consecutively and without blanks.
- .14 Provide in each elevator machine room a metal cabinet for the storage of approved lubricants and cleaning supplies. Provide a metal storage can for waste and oily rags.
- .15 All maintenance technicians and supervisors shall be dressed in company uniforms and must register with the designated building personnel.
- .16 Adjust the control system for optimum operation towards the end of the warranty period when the building is occupied.

1.23 MAINTENANCE CONTROL PROGRAM

- .1 At no cost to the Departmental Representative, provide for each elevator a maintenance control program (MCP) as per Clause 8.6.1.2.1 of the **B44 Code**. Elevator Consultant will be providing requirements from the Elevator Maintenance Specifications; to the successful bidder, to be incorporated into the MCP and signed as required by the maintenance specifications frequencies and requirements.

1.24 SCHEDULE

- .1 Refer to Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) chart.
- .2 In addition to Section 01 00 10, the following also applies.
- .3 All major components such as: machines, controllers, drives, crates of equipment, etc. must not be transported in the operating elevators during regular working hours. Any use of the operating elevators for moving equipment must be done after hours or on weekends , at no additional cost and must have the approval of the Departmental Representative.
- .4 One elevator at a time only from each group may be removed from service for modernization.
- .5 Any work requiring the removal of more than one elevator from service from a group, including regular preventive maintenance, shall be performed after normal working hours, at a time acceptable to the Departmental Representative. Contractor to include in the Tender for all costs related to any overtime work required to complete the work specified herein.
- .6 Carry out any odour, loud communication, or noise generating work and interior painting after normal working hours of the building and at a time which is acceptable to the Departmental Representative. Thoroughly ventilate areas painted during "off hours".

1.25 POWER SUPPLY

- .1 The existing Motor and Controller 600 Volts 3 Phase, 3 Wire , 60 Hz power supply will be retained.
- .2 The existing elevator Cab Lighting 120 Volts, 1 Phase, power supply will be retained

1.26 MARKINGS

- .1 All identification, instructions, and position indicators are to be in English and French.
- .2 English is to appear first on all marking or engravings and instructions.

1.27 USE OF ELEVATORS FOR PERSONS WITH PHYSICAL DISABILITIES

- .1 Fully comply with the requirements of Appendix E of the B44 Safety Code For Elevators and all other governing codes and regulations.
- .2 Locate all new car and hall operating buttons to comply with Appendix E requirements
- .3 Locate the PHONE button in the cab to between 890mm and 1220mm above the floor.

1.28 QUALITY OF WORK

- .1 The Contractor shall take into consideration the fact that this is an occupied building and must continue to function during the course of the modernization with a minimum of disruption.
- .2 The Contractor's employees shall be appropriately attired in Company Uniforms, be courteous to the occupants and abide by the same building rules and regulations required of the occupants.
- .3 All work must be performed in a manner that ensures the safety of the occupant and the user of the operating elevators. Should it be necessary to perform work where such safety cannot be ensured, it shall also be performed at a time acceptable to the Departmental Representative and during hours other than normal building business hours at no additional cost to the Departmental Representative.
- .4 Temporary hoarding shall be provided as required between hoistways to protect both the elevator mechanics and passengers from falling objects and debris.
- .5 All hoarding shall be removed at the end of the installation.
- .6 Provide barricades as required to protect the Public from hazardous conditions. Obtain Departmental Representative's approval for the appearance of all barricades erected.
- .7 The Contractor is to work only in the construction zones as identified in the contract documents.

1.29 TECHNICAL SEMINAR

- .1 Upon completion of the project, arrange with the Departmental Representative to provide two (2) seminars.
- .2 Each seminar shall include a complete review of all documentation, operation of the elevator equipment, and demonstration of special features and all life safety elevator operations. Allow a minimum of four (4) hours for each seminar.
- .3 All seminars to be carried out in both official languages.

PART 2 - PRODUCTS**2.1 MATERIALS AND COMPONENTS**

- .1 Use major elevator components from standard product line of one manufacturer
- .2 Major components includes; electrical controller, car door control equipment, and solid state motor drives.
- .3 All materials and equipment shall be new, and of the best quality of their respective kind. Furnish samples as directed by the Departmental Representative.
- .4 Provide only systems designed and field tested for the application, with adequate capacity to meet all performance criteria and to provide long term reliable operation.
- .5 All retained equipment shall be thoroughly refurbished, cleaned, painted and tested as required to ensure safe and proper operation and compliance with the B44 Code.
- .6 Stainless steel sheet metal: To ASTM A240 -85a, No.4 satin finish.
- .7 Paint to latest MPI requirements.

2.2 ELECTRICAL WIRING, CONDUIT AND FITTINGS

- .1 Provide all new B44 Code approved insulated wiring to connect all parts of the equipment including all wiring in hoistway, car top and car enclosure.
- .2 Provide new wiring from the mainline disconnects to the controller and transformer.
- .3 Provide all new wiring from the controller to the drive machine.
- .4 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct or conduit.
- .5 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 and identified on the controller.
- .6 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. Identify junction box as to it's function.
- .7 Provide ten percent (10%) additional minimum spare wires.
- .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.

Electrical Wiring, Conduit and Fittings - cont'd

- .11 Mark all individual wires by numbered adhesive waterproof markers.
- .12 Limit the use of flexible conduit on the car top to only those items that require movement or periodic adjustment. Use of excessive flexible conduit on car top will be rejected.
- .13 All flexible conduit that rests on the car top must be installed in a uni-strut which is at least the same height as the conduit.
- .14 The maximum number of conductors of one size in conduit or tubing must be in compliance with Table 6 of the Canadian Electrical Code. The maximum allowable per cent conduit and tubing fill must be in compliance with Table 8 of the Canadian Electrical Code.
- .15 Identify wires of multi-wire cables by colour code.
- .16 Label all terminal and junction boxes as to their function with permanently attached waterproof labels
- .17 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
- .18 Provide stranded field wire with no splices.
- .19 Provide uninterrupted shielded wiring from the communication device in the elevator to the junction box located on the side of the controller.
- .20 Attach to each controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
- .21 Provide a supplementary, uninterrupted shielded cable running from machine room to each 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.
- .22 Do not use armoured flexible metal conduit as grounding conductor. Provide a separate ground wire in all flexible metal conduit where grounding is required.
- .23 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.
- .24 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600 mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .25 Provide a separate identified green 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.
- .26 The conductors to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian Electrical Safety Codes. The wiring must be rated for 200E centigrade and be of the SF type or equivalent.
- .27 Neatly tie up or lace up and identify all spare wires in the controller.

2.3 EXISTING ELECTRICAL SERVICES

- .1 Design the equipment to operate using the existing 3 phase power supply. The voltage supply may fluctuate by $\pm 10\%$.
- .2 Provide a true earth ground, shielding, or bonding as required to suit the new elevator equipment. The true earth ground wire is to be the same size as the feeder wires.
- .3 Any modifications carried out to the existing electrical system relating to the elevator work, and all new wiring and piping from the mainline disconnect to the transformer must be carried out by a licensed electrician.

2.4 TRAVELLING CABLES

- .1 Replace all travelling cables with new B44Code approved flexible travelling cable designed specifically for elevator use. Provide type ETT cables.
- .2 Terminate cables on terminal blocks having identifying numbers to facilitate replacement and service.
- .3 Provide travelling cable with flame retarding and moisture resisting outer covers.
- .4 Suitably suspend the travelling cables to relieve strain in the individual conductors, (using a steel supporting strand with appropriate supports if the suspended weight exceeds 34 kg).
- .5 Provide ten percent (10%) additional minimum spare wires in each travelling cable.
- .6 Provide in the travelling cables, at least six (6) pairs, uninterrupted shielded wires.
- .7 Suspend and connect travelling cables so that they hang freely in the hoistway and do not rub against hoistway wall, trimmer beams, or brackets.

2.5 PIT STOP SWITCH

- .1 The existing pit switches may be retained. Provide an additional pit switch located near the top of the pit ladder. Provide red handles or buttons. Identify Stop and Run positions.
- .2 Provide new wiring to all pit switches.
- .3 Stencil elevator number minimum 50mm high on pit switch cover or adjacent to the switch.

2.6 LUBRICATION

- .1 Include means of lubricating bearings, requiring periodic lubrication.
- .2 When used, provide all grease fittings to fit same gun.
- .3 Provide visible and easily accessible lubrication points.

2.7 ROLLER GUIDES

- .1 Retain existing roller guide assemblies for car and counterweight. Thoroughly dismantle, clean and lubricate. Provide new rollers on all roller guide assemblies.
- .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 Adjust all roller guides to run smoothly and quietly on the guide rails.
- .6 For elevator # 5 only, provide new Model A tandem roller guides for the car only. Provide rollers wheels of minimum 152mm diameter.

2.8 SUSPENSION ROPES AND WEDGE CLAMP FASTENINGS

- .1 Provide new steel wire rope constructed for elevator service.
- .2 Ropes installed on any one elevator, shall be from the same factory production run.
- .3 Provide approved type wedge socket wire rope fastenings only
- .4 Provide individual compression springs on one end to equalize tension in ropes.
- .5 The returned end of the wire ropes on wedge clamp fastenings are to be secured with two (2) retaining clips. The first clip is to be set approximately 50mm above the top of the wedge clamp, the second clip at 100 mm above the first clip. The end of the wire rope is to be bound and tied or taped to prevent injury.
- .6 Provide minimum 9mm diameter metal anti-rotation devices to secure all terminations after installation to prevent rotation of fastenings in hitch plates.

2.9 GUIDE RAILS AND FASTENINGS

- .1 Check car and counterweight guide rail alignment and plumb same within maximum variation of 1.5 mm over any 6.1 m section.
- .2 Check all fastenings, brackets and fish plates to ensure secure and solid attachment of rails.
- .3 Use a rail gauge at each floor level for car and counterweight rails to check the distance between guides and rail alignment.
- .4 Thoroughly clean car and counterweight guide rails to ensure smooth operation of the roller guides.

2.10 INTERMEDIATE BEAMS

- .1 Check all intermediate beams and brackets for secure fastening to hoistway structure. Securely fasten any loose brackets or beams.

2.11 BUFFER EXTENSION AND SUPPORTS

- .1 Retain and refurbish all buffer extensions.

2.12 OIL BUFFERS

- .1 Retain and refurbish existing car and counterweight oil buffers.
- .2 Replace oil in all buffers with approved type elevator buffer oil.
- .3 Ensure that the buffer data plates to ensure plates are legible.

2.13 PIT EQUIPMENT

- .1 Retain and refurbish all pit equipment. Thoroughly wire brush and inspect all buffer channels.

2.14 COUNTERWEIGHT

- .1 Thoroughly inspect counterweight frame, bolts and fastenings for tightness.
- .2 Re-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 Statically balance the counterweight, so that at the centre of the hoistway the counterweight hangs in the centre of the rails with the top roller guides removed.
- .4 Check runby and post sign in the vicinity of the counterweight buffer indicating the maximum designed runby for this installation.
- .5 Provide a separate steel retaining guide to prevent the counterweight from leaving the guide rails in event that the roller guide assemblies leave their attachments. The retaining arrangement is to be fastened to the counterweight frame independent of the primary guiding means. Where travelling buffers are provided, separate retaining means are only required at the top of the counterweight frame.
- .6 Check and tighten counterweight rods or clamps to ensure that there is no rattling or vibrating of counterweight blocks or bricks.

2.15 CAR FREE-FALL SAFETY

- .1 Check safety device for operation in accordance with the B44 Code.
- .2 Retain and refurbish all parts of safety mechanism under elevator. Thoroughly clean off all safety mechanism, including releasing carriage on car top.
- .3 Perform full load overspeed test in the presence of the Departmental Representative.

2.16 CAR OVERSPEED PROTECTION

- .1 Provide means to prevent a car from Overspeeding in the ascending direction of travel in accordance with the B44 Code. Include all materials, new hoist ropes 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 overspeed, 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 Provide a hoist rope brake device to perform this safety feature
- .5 Contractor to submit details of proposed device to Departmental Representative for review.

2.17 CAR UNCONTROLLED LOW SPEED PROTECTION

- .1 Provide means to prevent any uncontrolled movement of the car in accordance with 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.
- .4 Provide a hoist rope brake device to perform this safety feature.
- .5 Devices which use pressurized cylinders or gasses are not acceptable.

2.18 CAR OVERSPEED GOVERNOR AND ROPE

- .1 Provide a new overspeed governor to suit car speed and capacity.
- .2 Spin test and seal governor.
- .3 Provide new governor rope.
- .4 Provide a new governor pit tension sheave.
- .5 Calibration of the governor shall be checked in the presence of the Departmental Representative.

2.19 GOVERNOR OVERSPEED SWITCH

- .1 Provide a governor overspeed switch to comply with Clause 2.18.4 of the B44 Code.

2.20 GOVERNOR SLOWDOWN SWITCH

- .1 Provide a governor slowdown switch. The slowdown switch shall be set to activate approximately .05mps before the overspeed switch trips.
- .2 Upon activation of the slowdown switch, the elevator controller will automatically initiate a slow down and stop the car at the next floor.
- .3 A stopped car will park with the doors open until the switch is manually reset.

2.21 GEARLESS TRACTION MACHINE

- .1 Remove existing geared machine and install new gearless machine.
- .2 Provide a Permanent Magnet AC gearless traction machine designed for elevator use.
- .3 Gearless machine to be designed to suit existing elevator speed and capacity.
- .4 Design brake to be spring applied, electromagnetically released and quietly operated by direct current. Design and adjust for holding the car cab with 125% of the rated load. Impregnate winding with insulation and bake to prevent absorption of moisture and oil.
- .5 Provide a new deflector sheave as required for the proper deflection of the hoist ropes.
- .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 Departmental Representative's satisfaction.
- .7 Provide a suitable machine base of proper height to allow for the installation of the hoist rope brake in the machine room.
- .8 Provide any additional beams, braces, or supports to accommodate the installation of the new machine on the existing machine beams.
- .9 Adjust the brake for smooth and quiet operation.

2.22 INDIVIDUAL MACHINE, SECONDARY LEVEL & OVERSPEED GOVERNOR GUARDING

- .1 Provide a removable metal guard around the machine as required by Section 24, 25, 75 and 76 of the OHSA requirements and CSA Standard Z432-04 - Safe Guarding of Machinery. Paint Guard Yellow.
- .2 Provide a removable metal guard around the overspeed governor. Use 9mm expanded metal for the enclosure. Paint guard yellow.
- .3 Securely fasten the overspeed guard to the floor with 6mm bolts.
- .4 Provide coloured shop drawings of all elevator machine room guarding components.
- .5 Guard all moving components in the secondary level including deflector sheave, hoist and governor ropes.
- .6 Include machine guarding on the TSSA design submission as part of the modernization scope of work.
- .7 Paint the elevator number in black 100mm high on the machine and governor guarding.

2.23 LIMIT SWITCHES

- .1 Replace all slowdown and final limit switches in the hoistway.
- .2 Provide new switches and wiring to suit speed of elevator. Switches to be silent in their operation.
- .3 Dowel final limits to brackets after final adjustment.

2.24 DIRECT CURRENT SUPPLY

- .1 Provide rectifiers to supply direct current for elevator machine brake, control and operating equipment.

2.25 VARIABLE VOLTAGE VARIABLE FREQUENCY CONTROL

- .1 Provide a variable voltage variable frequency, flux vector control system designed for a three phase AC induction motor. System to be capable of producing full torque at zero speed and shall utilize a shaft mounted position transducer to accurately measure the rotating frequency.
- .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.

Variable Voltage Variable Frequency Control - cont'd

- .4 Use a three-phase, full wave bridge rectifier and capacitor bank to provide a DC voltage bus for the solid-state inverter.
- .5 Use power semiconductor devices and pulse width modulation, with a carrier frequency of not less than 12 kHz, to synthesize the three-phase, variable voltage variable frequency output to operate the hoist motor in an essentially synchronous mode.
- .6 The drive shall not create excessive audible noise in the elevator motor.
- .7 Provide capability of being adjusted or programmed to achieve the required motor voltage, current, and frequency, in order to properly match the characteristics of the AC hoist motor. A.C. motor to have a slip specification of 5% or less, or a NEMA rating of "A" or "B".
- .8 Provide a heavy duty type drive, capable of delivering sufficient current required to accelerate the elevator to contract speed with rated load and be able to maintain a 180% to 200% current overload for 3 seconds and a 150% current overload for 60 seconds. Equip drive with an electronic automatic stall prevention and voltage boost to prevent nuisance tripping during load or line transient conditions.
- .9 Provide means for removing regenerated power from the drive's DC power supply during dynamic braking. This power shall be dissipated in a resistor bank, which shall be an integral part of the controller. Failure of the system to remove the regenerated power shall cause the drive's output to be removed from the hoist motor.
- .10 Provide a contactor to disconnect the hoist motor from the output of the drive unit each time the elevator stops. Monitor contactor to ensure that the elevator will not restart if the contactor has not returned to the de-energized position when the elevator stopped.
- .11 Open all power feed lines to the brake by an electro-mechanical switch. A single ground, short circuit or solid-state control failure shall not prevent the application of the brake.
- .12 Arrange to continuously monitor the performance of the elevator in such a way that if the car speed exceeds 0.75 m/s during inspection operation or levelling, the car shall shut down immediately. Provide manual resetting.
- .13 The system shall not require DC injection braking to control the stopping of the elevator.
- .14 Provide encoder feedback to regulate hoist motor speed. Mount encoder on the motor shaft.

2.26 TAPELESS AUTOMATIC SELF-LEVELLING FEATURE

- .1 Provide a maintenance-free tapeless self-levelling device which will automatically bring car to within 6.35 mm or better, above or below the landing sill.
- .2 Compensate for overtravel or undertravel and bring car level to landing sill.

2.27 ANTI-NUISANCE DEVICE

- .1 Provide a device to reduce delays caused by a number of registered calls that does not correspond to the number of passengers in the cab.
- .2 Cancel all registered car calls in the event that the elevator makes two consecutive stops without activation of the door detector. Do not permit registration of additional car calls until the door detector has been activated.

2.28 LOAD WEIGHING DEVICE

- .1 Provide a new load weighing system that shall be equipped with means to measure the load in the car within 5% of the elevator capacity.
- .2 This device to provide a signal to the controller for:
 - .1 Preventing a loaded car from answering registered hall calls.
 - .2 Designating hall calls to the most available car and controlling traffic analytically.
 - .3 Dispatching a parked car from the main floor as soon as the car has been loaded to a pre-set setting.
- .3 Adjust the load weighing device to ensure that it will operate over the required range of settings.
- .4 Ensure switch settings of load weighing are accurate within ± 22 kg. of the required settings.
- .5 Verify that the load weighing device has a long term stability such that the settings do not require re-adjustment more frequently than every two years.
- .6 Prevent the elevator from moving in the reverse direction when starting regardless of the load in the elevator

2.29 CONTROLLER AND CABINET

- .1 Remove existing controller and cabinet and provide new controller enclosed in enamelled, ventilated, sheet steel cabinets. Include hinged doors for easy access.
- .2 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
- .3 Provide electronic time delay devices which employ stable capacitors or crystals as time base.
- .4 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 grommets or similar connections.
- .5 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.

2.30 COMPUTING DEVICES

- .1 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.
- .2 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
- .3 Provide for separate regulated power supplies to serve each micro-processor system.

2.31 SELECTOR

- .1 Replace existing selector with a maintenance -free tapeless 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 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.

2.32 HOISTWAY SWITCHES

- .1 Hoistway switches shall be silent in their operation and inaudible to passengers in the car with the fan turned off.

2.33 SOLID-STATE HARDWARE

- .1 Mount solid-state devices, except for high power silicon controlled rectifiers and rectifiers, on removable printed circuit boards.
- .2 Gold plate the contact points of edge connectors.
- .3 Provide plated through holes for double sided boards.
- .4 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .5 "Patched" connections will not be accepted.
- .6 Design solid-state devices for a high load of noise immunity.
- .7 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.

2.34 CONTROL CIRCUIT GROUNDING

- .1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.

2.35 HOISTWAY DOORS

- .1 Check and adjust all doors to ensure doors will close smoothly, with the closing mechanism released and 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.
- .2 Provide metal sight guards on all hoistway doors. Securely fasten all sight guards.
- .3 Provide a rubber gasket between the metal sight guard and the hoistway door surface.
- .4 Adjust all doors for smooth and quiet operation.
- .5 Provide approved type safety retainers at top and bottom of hoistway doors.
- .6 Replace plastic rollers with steel rollers with neoprene inserts.

2.36 HOISTWAY ACCESS DEVICE

- .1 Provide at top and bottom landings new keyed hoistway access switches in accordance with the B44 Code. Bottom floor keyed hoistway access is not required where walk in pits are provided.
- .2 Locate switch in sight guard or beside hall door frame and engrave "Hoistway Access" with direction arrows on face plate.
- .3 Provide hoistway -door unlocking devices at every landing Provide stainless steel collars for all lunar key holes. Securely maintain collars in place.

2.37 HOISTWAY DOOR SILLS

- .1 Retain existing sills, check, clean and polish.

2.38 HOISTWAY DOOR ENTRANCE ASSEMBLIES

- .1 Check all entrance assemblies for proper and secure fastening to the building structure. Check for broken welds. Repair where required.
- .2 Securely fasten any loose entrance assemblies.

2.39 FASCIAS

- .1 Check fastenings, clean and ensure fascias are securely fasten in place to prevent rattling or vibration.

2.40 HOISTWAY DOOR HANGERS, TRACKS, LOCKS AND CLOSERS

- .1 Retain and refurbish existing hangers and tracks.
- .2 Clean and check tracks for deformation. Replace any deformed or worn tracks.
- .3 Clean, check, lubricate and adjust rollers and eccentrics to provide smooth and quiet operation. Adjust eccentrics to obtain minimum clearances. Replace all worn or noisy rollers or eccentrics.
- .4 Provide complete new door locks, beaks and pick-up rollers. New locks and beaks to be similar to existing. Dowel pickup roller assembly.
- .5 Provide all new relating cables. Provide guards on all hoistway door relating cable pulleys to B44 Code requirements.
- .6 Provide new wiring to the door locks. Provide a separate ground wire from door locks back to controller.
- .7 Remove existing spirators and provide new sill closers. Provide one sill closer for each centre-opening door panel.

2.41 CAR DOORS

- .1 Retain existing car doors. Provide two (2) new lower guides per door panel. Bend down fire pins on all new guides. Ensure that the guides penetrate a minimum 6.5mm into the sill.
- .2 Adjust car doors for quiet and smooth operation.
- .3 Reduce the clearance between car doors, and between car doors and frames to no more than 10mm.
- .4 Clad car doors with stainless steel #4 satin finish vertical grain.
- .5 Provide new rubber nosing on leading edge of each door panel.

2.42 CAR DOOR HANGERS AND TRACKS

- .1 Retain and refurbish existing, hangers, and track. Provide new rollers for each door panel. Provide rollers with ball or roller sealed bearings designed to retain lubricant.
- .2 Clean and check tracks for deformation. Replace any deformed or worn tracks.
- .3 Clean, check, lubricate and adjust rollers and eccentrics to provide smooth and quiet operation. Adjust eccentrics to obtain minimum clearances. Replace all worn or noisy rollers or eccentrics.
- .4 Provide new air cord to connect door panels.

2.43 CAR DOOR OPERATOR

- .1 Provide new high speed heavy duty closed -loop car door operation designed to open and close the car and hoistway doors simultaneously, quickly and smoothly.
- .2 Operate doors positively, reliably and consistently under varying hoistway air pressure conditions.
- .3 Open and close door operation to be electrically cushioned at final limits of door travel.
- .4 For centre opening doors, provide a new gate switch for each door panel. Each switch to be operated by a roller attached to each door panel. Provide a separate green ground wire to each switch.
- .5 Install and accurately fill in the car door operator data plate.
- .6 Provide restricted opening of the car doors when outside of the levelling zone.
- .7 The restrictor device shall be the non electric type that incorporates a long spring return metal bar on the car door and metal angles installed in the hoistway at the appropriate locations to provide restricted opening between floors.

2.44 INFRARED PROXIMITY DETECTOR

- .1 Remove the existing infrared proximity detector. Provide new three dimensional (3D) Panachrome proximity detector. Provide red/green indication to highlight door movement.
- .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. Provide 154 beam light curtain.
- .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.
- .5 Upon failure of the device, shut the car down at the next available floor, with the doors in the fully open position.

2.45 REDUCE SPEED DOOR CLOSING

- .1 Should the doors be held open by the "proximity detector" for more than 20.0 seconds, sound a buzzer and reduce the door closing kinetic energy to 3.5 j. Time delay to be adjustable.

2.46 CAR FRAME, PLATFORM AND SILL

- .1 Inspect complete car frame and platform to ensure all bolts are in place and tight and that hoist rope hitches are secure. Retain existing sills, clean and polish.

2.47 TOP OF CAR OPERATING DEVICE EQUIPMENT

- .1 Provide a new permanent top of car operating device. Include an alarm bell designed to operate on normal and emergency power, duplex receptacle, and work light.
- .2 In addition to the permanent device, provide a portable hand held operating fixture. Provide a sufficient length of cord to ensure safe operation from all areas of the car top. Provide means to securely store the fixture on the car top when the unit is not in use.

2.48 ELEVATOR NO. 5 C3 CAR LOADING MODIFICATIONS

- .1 For elevator #5 only, modify the existing car sill support as described below.
- .2 Install a new 12mm X 100mm steel plate full length of existing sill support angle approximately 2023mm long. Weld new plate to existing 100mm X 75mm X 6mm L. Welding to be carried out by a Certified welder in compliance with B44 Code Requirements.
- .3 Paint new steel plate with rust resistant black machinery enamel.
- .4 Check the static balance of the car after C3 loading modifications. Provide any additional balance weights as required.

2.49 ELEVATOR NO. 5 C3 LOADING HOISTWAY SILL MODIFICATIONS

- .1 For floors levels 01 and 1, remove the fascia plates and completely grout with cement under the full length of the hoistway sill similar to the other floors in this hoistway.

2.50 ALARM BELL

- .1 Provide an alarm bell located on the car designed to operate under permanent and emergency power conditions.
- .2 Provide a duplicate alarm bell in the hoistway at the designated level.

2.51 CAR & COUNTERWEIGHT WEIGHING

- .1 As required by the TSSA CAD clause 8.7.2.15.i 1, prior to the start and at the completion of the alteration, weight each car and counterweight separately. Record both weights.
- .2 Provide Departmental Representative with a digital photo of each recorded weight a copy of the actual recorded weights.
- .3 Provide on the car top and fill in an Auxiliary Weight Data Tag.

2.52 CAR CAB INTERIOR

- .1 General
 - .1 Retain and reuse existing cab interior, except as noted below.
- .2 Front Return Panels and Transom
 - .1 Re-clad front return panels, transom and car door frames in stainless steel #4 satin finish vertical grain.
- .3 Car Doors
 - .1 Re-clad car doors in stainless steel #4 satin finish vertical grain.

2.53 CAR OPERATING PANEL AND SERVICE CABINET

- .1 Completely replace all existing car operating panels.
- .2 Provide TWO new car operating panels, with hinged stainless steel face plates. Ensure that new panels completely cover redundant openings from the existing panels.
- .3 Locate all buttons in accordance with Appendix E, of the B44 Code.
- .4 Elevator buttons to be selected from a prestige product design. Provide Bi-lite illuminated buttons. Tactile floor number to be illuminated white and turn blue when call is registered.
- .5 Provide raised numerals with braille to the left of each button, incorporated into and forming part of the button. Where possible use international symbols. All other markings to be engraved on the faceplate in both official languages.
- .6 Common devices to be included in each car station are as follows:
 - .1 Floor push buttons with integral BLUE illumination using LED type lights with a minimum 100,000 hour rating. Illuminate button 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. Provide and illuminate the wording "Door Open and Door Close" on the buttons. Provide Bi Colour White - Blue buttons. Engrave the bilingual wording "door open" and "door close" above or below the buttons.
 - .3 Door open buttons on both the main and auxiliary car operating panels are to be adjacent to the door opening.
 - .4 "PHONE" button to be installed a minimum of 890mm above the floor and maximum 1220mm above the floor. Provide a raised 6mm high stainless collar around the "PHONE" button to prevent accidental activation. Spot weld collar to car operating panel.

Car Operating Panel and Service Cabinet - cont'd

- .5 Lens for Emergency Lighting System
- .6 Car position indicators.
- .7 Provide the following devices in the auxiliary car station when two car stations are provided.
 - .1 Perforation holes for a hands free communication system, as specified elsewhere in these specifications. Beside the phone button, provide a Yellow International Telephone Symbol and Yellow engraved bilingual wording "PHONE". Button to be located at 1220 mm above the floor.
 - .1 Provide one Red LED to flash as the auto-dialler dials out. Engrave beside the Red indicator "call in progress".
 - .2 Provide one Green LED to illuminate when the call has been connected. Engrave beside the Green indicator "call acknowledged".
 - .2 Visual and audible signal for Special Emergency Recall Operation.
- .8 Provide in the main car station a service cabinet with a hinged, self locking door. Provide metal toggle switches inside the service cabinet, appropriately marked by bilingual wording or symbols, to control the following:
 - .1 Car Lights
 - .2 Car ventilating fan
 - .3 Test button for emergency lighting
 - .4 Independent service switch
 - .5 Emergency stop key switch
 - .6 Provide one spare toggle switch
 - .7 Inspection operation key switch
 - .8 One 120 Volt GFI receptacle
- .9 Engrave the following on both operating panels.
 - .1 Elevator Number in minimum 50 mm numerals
 - .2 Elevator Capacity in Kilograms and Number of Persons
 - .3 Licence located in machine room" in letters 12mm in height. Engrave with black fill.
 - .4 TSSA Installation Number and Logo

2.54 CAR POSITION INDICATOR

- .1 Provide new digital car position indicators located near the top of each car operating panel. Indicators to display identical markings to car operating buttons, including bilingual markings for main and basement floors. Numerals to be minimum 50mm high to match hall indicators.
- .2 Provide an audible signal to sound when the car passes a floor. Signal volume to be adjustable between 50 and 70 dBA.
- .3 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels.

2.55 IN-CAR LANTERNS AND GONGS

- .1 For elevators number 1 and 2 only, Provide new in-car lanterns with electronic "Chime" type gongs. Locate lanterns in car door jamb posts in location of the existing fixtures. Provide two fixtures per elevator.
- .2 The lantern indicator shall consist of an LED digital display in the shape of an arrow, mounted flush with the faceplate. Use LED type, 100,000 hour rating, on a high resolution screen display.
 - .1 Visual elements shall be a minimum of 60 mm in the smallest direction.
 - .2 The lens for the Up direction shall be green in colour, and the lens for the Down direction shall be red in colour.
- .3 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. Lantern to remain illuminated until the car closes its doors.
- .4 In case of over travel arrange the in-car lantern to remain illuminated indicating original direction of travel.
- .5 Sound gong once for "UP" and twice for "DOWN" stops.
- .6 Lantern fixture plate shall be of stainless steel No. 4 finish and brushed vertically.
- .7 Fasteners shall be of the vandal resistant type.

2.56 HALL POSITION INDICATORS

- .1 Remove all hall position indicators. Cover complete transom with stainless steel #4 satin finish to conceal all redundant indicator components.
- .2 Provide new surface mount oval shaped inch line plus fixtures combining a digital position indicator and direction lantern. Install new fixtures in location of existing indicators. Use BLUE LED type, 100,000 hour rating, on a high resolution screen display.
- .3 The Direction Lantern is to remain illuminated to indicate the the selected car is available for dispatch.
- .4 Provide an advanced audible signal to indicate car arrival a minimum of five (5) seconds before door opening.
- .5 Display letters and numbers in segmented format at least 50 mm in height. Indicators to display identical markings to car operating buttons.
- .6 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously, in scrolling format, between floor levels.

2.57 TYPICAL FLOOR HALL LANTERNS AND GONGS

- .1 For elevators No. 3-4-5.
- .2 Replace all hall lanterns.
- .3 Provide new oval incline hall lanterns with electronic chimes installed horizontally.
- .4 Include UP and DOWN directional lanterns for intermediate floors and single directional lanterns for the top and bottom floors. Provide blue LED illumination.
- .5 Arrange lanterns so that as soon as the car has initiated a stop at a floor, the corresponding hall lantern illuminates and the gong operates 5 seconds in advance of the stop. Provide an audible signal to sound when the car stops at a floor. Signal volume to be adjustable between 60 and 90 dBA. Lantern to remain illuminated until the car closes its doors.
- .6 Sound chime once for "UP" stops and twice for "DOWN" stops.

2.58 HALL BUTTONS

- .1 Provide new extended hall button fixtures identical in design to those provided in the car stations. Provide integral illumination using 100,000 hour rated blue LED illumination.
- .2 Install single hall buttons at each terminal floor and UP and DOWN buttons at each intermediate floor. Illuminate corresponding "UP" or "DOWN" call button when call is registered. Extinguish illumination when call has been answered.
- .3 Install new fixtures in the same location as existing.
- .4 Provide new wiring to all new hall buttons.
- .5 In the hall button fixtures at the 01 floor, provide a hall position indicator for the elevator which serves this level. Display segmented numerals minimum 38mm high.
- .6 Provide on each hall button fixture cover a bilingual Elevator Corridor Call Station Pictograph as per Figure 2.27.9 of the B44 Code.

2.59 SPECIAL HALL STATION AT DESIGNATED FLOOR

- .1 Provide for each group of elevators at the designated level in the location of the existing emergency power and recall key fixtures a flush mounted stainless steel fixture containing the designated level recall switch with appropriate indicator lights.
- .2 The key switch shall be a three 3 position RESET- OFF- ON for the Fire Recall service. Provide quality type key FEO-K1 switches of the Group 3 classification.
- .3 Provide in this fixture, a selector switch engraved with one position for each elevator and one auto position for the emergency power service. Engrave the wording ELEVATOR EMERGENCY POWER in red lettering.

Special Hall Station at Designated Floor - cont'd

- .4 Include in this fixture a pilot light to indicate that the emergency power is in effect, and a pilot light to indicate which elevator is on emergency power.
- .5 Provide at the designated level near the elevator hoistway an identified metal box containing the emergency recall keys.
- .6 Provide all cutting and patching to accommodate this fixture.
- .7 Ensure that manual emergency recall is operational on all operating elevators during the modernization project.
- .8 Completely remove any redundant wiring from the existing fixtures and cover redundant generator key switch and indicator light fixtures with a #4 stainless steel faceplate.

2.60 SIGNAL ILLUMINATION

- .1 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.

2.61 FACEPLATE FASTENINGS

- .1 Fasten all signal fixture face plates securely with unexposed fasteners or with tamper-proof fasteners.

2.62 CAR EMERGENCY LIGHTING

- .1 Provide new battery operated emergency lighting equipment. The lens is to be incorporated into each car operating panel.
- .2 Provide general illumination in the car with a minimum of 2 lx intensity 1200mm above the car floor and 300mm in front of the operating panels for at least a four (4) hour period.
- .3 Include means for convenient manual operation and testing of the unit in the car station service cabinet. Arrange test button to turn off normal lighting when testing emergency lighting.

2.63 CAR VENTILATION

- .1 Provide ventilation by a new exhaust air handling unit through cab ceiling.
- .2 Limit total fan noise to 55 dBA as read from 0.9 m above floor with fan on high speed.
- .3 Mount air handling unit on top of car and effectively sound isolate system from car to prevent transmission of vibration to car structure.
- .4 Include two speed operation of ventilation system: approximately 330 dm³/sec on high speed and 165 dm³/sec on low speed.

2.64 AUDIBLE & VERBAL FLOOR ANNOUNCEMENT

- .1 Provide verbal floor announcement as per clause E9.3 of the B44 Code.
- .2 Provide and install a digitally controlled voice synthesizer for various messages in French and English.
- .3 The voice synthesizer should include the following messages, in English and followed in French.
 - .1 Floor served
 - .2 Direction of travel of car
 - .3 "This elevator is on special service. Please exit the elevator when the doors open"
 - .4 "Do not be alarmed, this elevator is transferring to emergency power and will return to the first floor"
 - .5 "Please exit the car"
 - .6 "Please allow the doors to close"
- .4 Announcement of floor and direction will be made when a car answers a car or a landing call prior to door opening operation.
- .5 Elevator related emergency messages will be announced whenever the elevator goes on a particular special operation.

2.65 ELEVATOR REMOTE MONITORING SYSTEM

- .1 The Remote Monitoring System (RMS) shall be connected in each machine room, for remote monitoring of the five (5) passenger elevators and the freight elevator. It shall contain all the equipment and interconnections necessary to maintain the appropriate database as it communicates with and monitors the various elevator control systems.
- .2 The RMS hardware shall include all required personal computers, printers, modems wiring, cabling and other external components as required to effectively perform the required functions. As a minimum, the hardware shall include two modems, one coloured printer, two dedicated analog phone lines and a computer.
- .3 Monitoring screens and computer equipment will be located in the Security Control Room and at the Security Guard desk as identified in these specifications.
- .4 Graphic Hoistway Display - The Remote Monitoring System shall display the elevator system hoistway so that users will be able to view a graphical representation of the elevator hoistway. The graphic hoistway display shall include, but is not limited to, the following:
 - .1 Registration of car calls.
 - .2 Registration of hall calls.
 - .3 Identification of floors.
 - .4 Simulated progressive position of the elevator
 - .5 Simulated opening and closing of elevator doors.
 - .6 Independent Service Operation, On or Off.
 - .7 Emergency Power Operation, On or Off.
 - .8 Emergency designated Operation, On or Off.
 - .9 In-Car Emergency Service Operation, On or Off.
 - .10 Inspection Service, On or Off.
 - .11 Security designated Operation, On or Off.

Elevator Remote Monitoring System - cont'd

- .5 Provide a record in real time and date, over a minimum 180 day period, of all defined events that have occurred. Provide, either the means and any special software required, to copy this data onto diskette for printing by the Departmental Representative, and a letter quality coloured printer in the security control room as identified on the electrical drawings.
- .6 The defined events shall be as follows:
 - .1 The actual date and time.
 - .2 Defective safety circuit.
 - .3 Defective micro-processor.
 - .4 Car stopped out of the zone (except on inspection).
 - .5 Defective car door switch.
 - .6 Defective hoistway door interlock.
 - .7 Defective door operation.
 - .8 Faulty phase.
 - .9 Overspeed.
 - .10 Loss of the tachometer.
 - .11 Acceleration defect.
 - .12 Deceleration defect.
 - .13 Loss of motor field.
 - .14 Overloaded elevator
 - .15 Car out of service
 - .16 Group control out of service
 - .17 Refusal of car to start
- .7 Provide a performance analysis of any hour per day, to a minimum of a 5 minute basis. Record in real time and date over a minimum 60 day period. Provide, the means and any special software required, to copy this data onto diskette for printing by the Departmental Representative, and a letter quality printer in the security room.
- .8 The analysis shall include the following:
 - .1 Number of calls answered between 0 and 30 seconds.
 - .2 Number of calls answered between 31 and 45 seconds.
 - .3 Number of calls answered between 46 and 90 seconds.
 - .4 Number of calls answered between 91 and 120 seconds.
 - .5 Number of calls answered between 121 and 180 seconds.
 - .6 Number of up calls.
 - .7 Number of down calls.
 - .8 Total amount of calls.
 - .9 The maximum waiting time.
 - .10 Average waiting time
 - .11 The date and time of the resetting.
 - .12 The actual date and time.
 - .13 The waiting time in up direction.
 - .14 The waiting time in down direction.
 - .15 The total waiting time.
- .9 Emergency Notification: In case of a unit shutdown, the system shall have the ability to page designated personnel to notify them of an emergency event.
- .10 The system shall have the provisions to provide a multiple level of password protection for the user of the system.

2.66 REMOTE ACCESS

- .1 Provide a high speed modem for remote access for system analysis. All features including traffic analysis, system faults and performance as provided at the machine room console shall be retrievable at a remote station via telephone network. Include all hardware and software required to monitor the elevators from a remote location by internet service.

2.67 SECURITY CONTROL ROOM

- .1 Provide in the security control room as shown on the electrical drawings, a complete remote monitoring system capable of monitoring all low rise elevators including the freight elevator.
- .2 The remote monitoring system, as a minimum, will consist of the following:
 - .1 CPU: Intel Core I3-2130 = 3.40 Ghz
 - .2 Memory: 8 GB
 - .3 Hard Drive: 1.5 TB
 - .4 One (1) 430mm LCD flat screen colour monitor
 - .5 Current windows operating system software
 - .6 UPS power source
 - .7 Coloured printer with cable
 - .8 Keyboard
 - .9 One internal modem (9600 baud rate or higher)
 - .10 One internal modem to connect to operate the remote system
 - .11 DVD-RW drive
- .3 The system shall have the minimum capabilities of recalling and controlling each low rise elevator including the freight elevator, from the mouse and keyboard.
 - .1 Lobby Recall
 - .2 Fireman's Service
 - .3 Freight Car Recall
 - .4 Car Call Security Lockout
 - .5 Hall Call Security Lockout
 - .6 Independent Service
 - .7 VIP Service
 - .8 Emergency Power Selected Car

2.68 SECURITY GUARD DESK

- .1 Provide at the Security Guard Desk location as shown on the electrical drawings, a remote monitoring screen capable of monitoring all low rise elevators including the freight elevator.
- .2 Provide all cabling and computer equipment as required to provide a complete monitoring system. The monitoring system is required for monitoring only the operational status of the elevator systems.

2.69 ELEVATOR REMOTE MONITORING SYSTEM MAINTENANCE

- .1 The remote monitoring system is considered as part of the elevator system and, as such, maintenance of the system must be included as part of the overall preventive contract for the elevator equipment.
- .2 The maintenance of the computer equipment is based on normal maintenance usually required for personal computers.
- .3 System Maintenance
 - .1 Inspect operation of modem, hard drive and printer quarterly.
 - .2 Evaluate system operation at reasonable levels based on usage of the system.
 - .3 Back-up data base at reasonable intervals.
 - .4 Inspect external connections on a monthly basis.
 - .5 Clean the monitor screen at reasonable intervals based on site conditions.
- .4 Interface Panel Maintenance
 - .1 Clean interface panel quarterly
 - .2 Inspect interface panel monthly
 - .3 Check all connections annually for integrity.
- .5 Testing
 - .1 Test the UPS system quarterly, minimum.
 - .2 Inspect the data integrity quarterly.
 - .3 Test the interactive security features bi weekly
 - .4 Review the traffic analysis data at least monthly or sooner as required.
- .6 Comply fully with the equipment manufacturer's maintenance procedures and recommendations.

2.70 EMERGENCY COMMUNICATIONS SYSTEM IN THE CAR

- .1 Provide a hands free, vandal resistant, emergency communications device containing an internal adjustable volume control speaker and microphone, mounted on a hinged and locked panel in the car station to enable two-way voice communication between the car and a location in the building that is readily accessible to authorized and emergency personnel. The locked panel is to be similar to, and be keyed the same as the service panel.
- .2 The device shall be activated by pressing the PHONE button located in each car station and shall automatically ring a telephone number of the Departmental Representative's choice. Once activated in the elevator the line shall remain open until disconnected by the receiver. Button to be located at 1220 mm above the floor.

Emergency Communications System in the car - cont'd

- .3 Provide one Red LED to flash as the auto-dialler dials out. Engrave beside the Red indicator "call in progress".
- .4 Provide one Green LED to illuminate when the call has been connected. Engrave beside the Green indicator "call acknowledged".
- .5 The line dialler network shall operate on any dedicated phone line along with conventional phones and shall have an internal battery for memory back-up for a minimum of two hours in the event that power fails or the dialler is removed from the telephone line.
- .6 The device shall contain a ring sensor which shall allow the initiation of a call to the elevator. The number of rings shall be adjustable. The two-way communication shall not be transmitted to an automatic answering system.
- .7 The two-way communications, once established, shall be disconnected only when authorized personnel outside the car terminate the call.
- .8 The two-way communications means shall provide on demand to authorized personnel, information that identifies the building location and elevator number and that assistance is required.
- .9 Provide all wiring and phone lines, necessary for the complete installation of the system from the device in the elevator to an externally located terminal in the elevator machine room. Connect to the telephone line.
- .10 Supply, install and connect all the necessary wiring and equipment as required for a complete and operational intercommunication system.
- .11 The two-way communications means shall not use a handset in the car.
- .12 If the emergency communication means is connected to the building power supply, it shall automatically transfer to a source of standby or emergency power as required by the applicable building code, after the normal power fails. The power source shall be capable of providing for illumination of the visual indication within the car, and the means of emergency communications for at least 4 hours; and the audible signaling device for at least 1 hour.

2.71 EMERGENCY COMMUNICATIONS SYSTEM IN THE CAR VERIFICATION

- .1 Comply with Clause 2.27.1.1.6 of the B44 Code.
- .2 Provide a minimum of one illuminated visual and audible signal for each group of elevators controlled by the Fire Recall Switch. Provide a stainless steel faceplate.
- .3 The visual signal is to be located at the designated landing in the vicinity of the Fire Recall Switch.
- .4 Provide all Bilingual engraving as required.

2.72 INTERCOM SYSTEM

- .1 Provide for all low rise elevators including the freight elevator, an electronic desk type telephone two (2) way inter-communication system including one master control at the security guard desk in the main entrance lobby as indicated on the electrical drawings . Provide one satellite master control in each elevator machine room. Provide one speaker in the car operating panel of each elevator car cab. Include all necessary control and wiring for a complete system.
- .2 The master stations are to permit communication either individually or in groups, in the case of a general call to all elevators.
- .3 The master station at the security guard desk shall provide as a minimum, means to:
 - .1 Select each elevator cab, or machine room, individually.
 - .2 Select a general call to all low rise elevators including the freight elevator.
- .4 Provide adjustable input and output so that a master or satellite station can control its receiving and transmitting signals.
- .5 Provide each master and satellite station with a handset for voice communication.
- .6 Master stations in each machine room to be restricted to the elevators within its own group and to the main security guard desk. Provide all features as described for the main console.
- .7 Provide a 98% shielded cable covered with PVC including required isolated copper inductor No. 20 AWG.
- .8 Supply, install and connect all the necessary wiring and equipment as required for a complete and operational intercommunication system.
- .9 Identify master stations as Low Rise Elevator Emergency Telephone.

2.73 BILINGUAL MARKINGS

- .1 Engrave identification and instructions at least 0.25 mm deep on operating panels and on all signal equipment in both English and French except where design is such that inference is obvious and readily understood. All floor markings for car and hall indicators to be bilingual.
- .2 All engraving to be English first, followed by French.

2.74 KEYS

- .1 Provide six (6) sets of keys for each control device and twelve (12) keys for Special Emergency Service.
- .2 Organize keys on suitable key rings with permanently engraved tags, clearly identifying use. Tags to be approved by Departmental Representative.
- .3 All keys shall be grouped as per the B44 Code.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND PROCEDURE

- .1 Only one elevator at a time from each group is to be removed for the modernization.
- .2 Install all equipment in a first class workmanship manner. Upon completion do all necessary repairs, cleaning, and painting as required to turn the equipment over in "New Condition".

3.2 ARRANGEMENT OF EQUIPMENT

- .1 Arrange equipment in machine room so that rotating elements, sheaves and other equipment can be removed for repairs or replacement without dismantling or removing other equipment components.
- .2 Arrange equipment for clear passage.
- .3 Arrange equipment according to machine room layout.
- .4 Accommodate equipment in provided space according to above mentioned requirements.

3.3 WELDING

- .1 All field welds shall be identified with the welder's identification stamp.

3.4 INTERLOCK

- .1 Permanently dowel interlock pick-up roller supports.

3.5 SURFACE PROTECTION

- .1 Provide protective coverings for finished surfaces.

3.6 LIMIT SWITCHES

- .1 Subsequent to the performance of safety tests and checks by the Inspecting Authorities, fasten final limit switches and brackets by through bolting or dowelling.

3.7 BRAKE

- .1 Adjust brake to hold car cab plus 125% of the rated load.
- .2 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
- .3 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.
- .4 Provide and fill out brake setting data plate after final adjusting.

3.8 CAR BALANCE

- .1 Check the static balance of the car.
- .2 Adjust the equipment and all guide rollers so that at any point the pressure upon the rollers does not exceed 11 kg with closed doors and empty car cab.

3.9 COUNTERWEIGHT BALANCE

- .1 Check the static balance of the counterweight.
- .2 Adjust the equipment and all guide rollers so that at any point the pressure upon the rollers does not exceed 11 kg.
- .3 Check and adjust as required to ensure that the counterweight is equal to the complete elevator cab plus between 40 to 42.5% of the contract load.

3.10 SPEED VARIATION

- .1 Adjust for speed variation as follows:
 - .1 When lifting rated load, do not permit car speed to vary from rated speed by more than 2%.
 - .2 When operating under varying normal conditions, i.e. rated load to no load, do not permit operating conditions to exceed 2%.

3.11 OPERATING TIME

- .1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed 11.0 seconds in both directions.
- .2 Measure this time as follows:
 - .1 The time starts when the fully opened doors begin to close and continues until the car is stopped level with the next floor and the car and hall doors are open to three-quarters of their fully open position.
 - .2 Floor level is considered to be within 6.35 mm of level.

Operating Time - cont'd

- .3 The time is measured with full load in the car and in both directions of travel.
- .4 The power door operation for the hall and car doors conforms to the elevator safety code requirements.
- .5 Adjust the equipment so that for other conditions of loading, the time does not vary more than five percent (5%).
- .6 The car call dwell time is to be initially set at between 2.0 to 3.0 seconds.
- .7 The hall dwell time is to be initially set at between 3.0 to 4.0 seconds.
- .8 Adjust the equipment so that the operating time, as set out above, is compatible with dependable, consistent operation without undue wear or excessive maintenance and can be readily maintained over the life of the elevator installation.
- .9 Adjust the equipment so that with the control adjusted to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride to the passengers.

3.12 DOOR ADJUSTMENT

- .1 Arrange levelling and door opening controls in such a manner that the doors start to open during the levelling zone and the doors are open to three quarters of fully open when the car is stopped level with the floor.
- .2 The time required to open the doors measured from start of open to fully open position shall not exceed 2.0 seconds.
- .3 The time required to close the doors measured from start of close to fully closed position shall not exceed 2.8 seconds.

3.13 RIDE PERFORMANCE

- .1 Acceleration/Deceleration
 - .1 Adjust the equipment to allow the car to start, accelerate, decelerate and stop smoothly.
 - .2 Adjust rate of acceleration to between 1.0 and 1.1 m/s².
 - .3 Adjust deceleration to the negative of the acceleration with final ramp being equal to the initial.
- .2 Jerk
 - .1 Adjust the change in the rate of acceleration and deceleration (jerk) to not exceed 2.5 m/s².

3.14 NOISE LEVELS

- .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 at rest not to exceed 40 dBA.
 - .2 Inside the car with doors closed, fan off, and car running not to exceed 60 dBA.
 - .3 Inside the car, with the fan off, during full door opening and closing not to exceed 65 dBA.
 - .4 Inside the car, with the fan off, during door reversal not to exceed 65 dBA.

3.15 COMMISSIONING PLAN

- .1 Responsibilities
 - .1 Various responsibilities of the commissioning process are as follows:
 - .1 The Departmental Representative is responsible for overall coordination of commissioning activities review and approval of all documentation, overview of performance, verification activities, verification of the accuracy of all reported results.
 - .2 Departmental Representative - overall responsibility for witnessing and certification of the performance of commissioning activities.
 - .3 Contractor - overall responsibility for performance of all commissioning activities and recording of all results.
- .2 Commissioning Schedule
 - .1 The Contractor will be responsible for providing a schedule for commissioning which is to include the following milestones: start-up, training, delivery of O&M Manuals, schedule, and sequencing of commissioning, acceptance, occupancy.
 - .2 Commission all components, systems, and integrated systems in accordance with the requirements of Section 01 91 13 General Commissioning (Cx) Requirements.

3.16 INSPECTIONS FIELD TESTS AND COMMISSIONING

- .1 Furnish a competent personnel to assist the Departmental Representative during the inspection and testing of the systems. Make the appropriate corrections until final acceptance of the installations.
- .2 The inspections will be carried out to ensure that the workmanship is in compliance with plans and specifications.
- .3 Provide one weeks notice for testing. Prior to giving notice the Contractor shall test all systems to ensure proper operation.
- .4 Perform all tests as required by the B44 Code.
- .5 Upon completion of each elevator provide all personnel, instruments and devices required to perform the following:
 - .1 Test car and counterweight balance to verify specification requirements.
 - .2 Test the equipment under full load and no load to verify the speed variation performance requirements.
 - .3 Upon completion of each group of elevators furnish competent technicians, adjusters or engineers fully trained on the equipment installed to check and test all operating systems including but not limited to, emergency power operation, special emergency service, central control console, and the operation of the group control system to verify the specification requirements.

3.17 NOTIFICATION TO DEPARTMENTAL REPRESENTATIVE

- .1 The Departmental Representative will periodically inspect the work, but is to be notified specifically for the following:
 - .1 One week prior to commencement of work
 - .2 On delivery of material to the site
 - .3 One week prior to TSSA Inspection
 - .4 On completion of all deficiencies

3.18 TEST DATA FORMS

- .1 After completion of the work after each elevator, complete and submit to the Departmental Representative and Consultant the following form.

Elevator No.	
CAR SPEED UP (fpm)	
CAR SPEED DOWN (fpm)	
FLOOR TO FLOOR TIME UP (seconds)	
FLOOR TO FLOOR TIME DOWN (seconds)	
BRAKE TO BRAKE TIME UP (seconds)	
BRAKE TO BRAKE TIME DOWN (seconds)	
EMPTY CAR - RUNNING CURRENT UP (amps)	
EMPTY CAR - RUNNING CURRENT DOWN (amps)	
FULL LOAD - RUNNING CURRENT UP (amps)	
FULL LOAD - RUNNING CURRENT DOWN (amps)	
CAR DOOR OPEN TIME (seconds)	
CAR DOOR CLOSE TIME (seconds)	
CAR CALL DWELL TIME (seconds)	
HALL CALL DWELL TIME (seconds)	
NUDGING TIME OUT (seconds)	
DOOR CLOSING STALL FORCE (lbs)	
LEVELLING ACCURACY (")	
TYPE OF DOORS - Single Slide - Two Speed - Centre Parting	
DOOR ENTRANCE SIZE (")	
CODE ZONE DISTANCE (")	
NUDGING TIME IN CODE ZONE DISTANCE (seconds)	
SAFETY SLIDE DISTANCE (inches)	
GOVERNOR OVERSPEED SWITCH TRIP (fpm)	
SAFETY APPLICATION TRIP SPEED (fpm)	
ACCELERATION RATE (G force)	
DECELERATION RATE (G force)	
JERK RATE (G force)	
CAR CAB NOISE LEVEL - CAR RUNNING - FAN OFF	
TESTS PERFORMED BY:	DATE:

- .2 These forms shall be signed by the person responsible for the performance of the work.

3.19 CLEANING AND PAINTING

- .1 Upon completion thoroughly clean, remove all indications of rust and paint the following in accordance with Section 09 91 23.01 - Interior Re-painting. Use only Low Odour paint.
 - .1 Machine room, secondary level and pit floor. Use grey floor paint.
 - .2 Horizontal area of the refuge space on the car top.
 - .3 Car top grey. Crosshead in rust resistant black paint.
 - .4 Counterweight frame and blocks in rust resistant yellow paint.
 - .5 Counterweight auxiliary guides in yellow.
 - .6 Car and counterweight buffer channels in rust resistant black paint.
 - .7 Horizontal area of the refuge space in the pit
 - .8 Pit ladder - yellow in colour
 - .9 Safety Railing on car top - yellow in colour.
 - .10 Hoistway fascia plates and toe guards in rust resistant black paint.
 - .11 Car and counterweight rails.
 - .12 Counterweight guard black.

END OF SECTION