

PART I - GENERAL

1.1 Project
Overview

- .1 The work described herein includes for all labour and material, including overtime required to meet the contract schedule, to modernize to first-rate standards five (5) passenger elevators, designated on site at 395 Wellington Street, Ottawa as elevators A, B, C, D and E and to meet existing space requirements and site conditions. Provide a finished project working and suitable for passenger use to include, but not limited to, the following:
- .2 Refurbish the gearless traction machines and replace geared machines.
- .3 Provide new, regenerative motor drives. Provide VVVF drives with new AC motors for geared elevators and SCR drives for gearless elevators.
- .4 Provide new microprocessor-based, solid state electrical controllers.
- .5 Provide rope brakes to achieve up-overspeed and uncontrolled low speed protection.
- .6 Provide new heavy-duty, closed loop door operators, related hardware, door-lock contacts and closers.
- .7 Provide/refurbish fixtures and car-operating panels as specified but in all cases meet Barrier Free design requirements.
- .8 Provide full parts and labour preventive maintenance on existing equipment from contract award, throughout modernization work and for the subsequent 12 month warranty period.
- .9 Refurbish car and counterweight safety devices. Provide new speed governors.
- .10 Provide automatic emergency recall and in-car emergency service.
- .11 Include all associated electrical work as outlined herein.
- .12 Above is a brief description only. The following specifications detail the Work.

1.2 Related Work by
Elevator Contractor

- .1 Provide updated crosshead data plates on car tops complete with all pertinent information required by Code.
- .2 Patch all redundant holes in machine room floor and landing walls.
- .3 Co-ordinate subcontract required to make modifications to fire signals and emergency power system.
- .4 Retain existing machine room fluorescent lighting. If new machine room layout necessitates extra lighting to meet light levels required by Code, provide extra fluorescent lighting.
- .5 Provide one (1) new 24" fluorescent fixture per pit, suitable guarded, located to maximize ambient light.
- .6 Retain existing security system. Include security sub-contract as required to restore system to its present operating state with new elevator controllers.

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| | .7 | Accomplish sloping of all edges in hoistway to 70 degrees from horizontal, to meet code requirements. |
| | .8 | Interlock pit access doors as required by Code. |
| <u>1.3 Procedure</u> | .1 | Obtain Departmental Representative=s approval before removing an elevator from group operation. |
| | .2 | In the instance that one elevator stops operating normally during the modernization of other elevators, utilize the on-site service crew to immediately assist any trapped persons and restore one of the elevators to operation. |
| | .3 | Allow for a Arun-in@ period of two (2) days after any modernized car is returned to service before removing a subsequent car from service. |
| | .4 | Modernize the elevators consecutively, in accordance with the project schedule. |
| <u>1.4 Fire and Safety Requirements</u> | .1 | Comply with National Building Code 2010 (Part 8, Health and Safety Measures at Construction and Demolition Sites) and Provincial Regulations for Construction Projects. |
| | .2 | Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada. |
| | .3 | Comply with the Departmental Representative=s Hot Works and site security regulations. |
| <u>1.5 Powder Actuated Fastening Devices</u> | .1 | Do not use powder actuated tools using explosives, unless approved in writing by the Departmental Representative, and in conformance with CAN3-Z166.2, <i>Use and Handling of Powder Actuated Tools</i> . |
| <u>1.6 Cutting, Patching and Making Good</u> | .1 | Cut existing surfaces as required to accommodate new work. |
| | .2 | Patch and make good surface cuts, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture. |
| <u>1.7 Building Smoking</u> | .1 | Obey and direct sub-contractors, suppliers and delivery people to obey, Departmental Representative=s site restrictions on smoking. |
| | .2 | Do not smoke in building including the elevator machine room, hoistway and pit area. |
| <u>1.8 Dust Control</u> | .1 | Provide dust tight screens or partitions to localize dust generating activities and for protection of workers, finished areas of work and public. |
| | .2 | Maintain and relocate protection until such work is completed. |
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- .3 Protect Departmental Representative's property adjacent to work area with low fire spread tarps or screens during construction. Remove protection during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.

1.9 Scheduling

- .1 Within two (2) weeks of obtaining Departmental Representative's intent to proceed with the Work, submit to Departmental Representative a bar chart construction schedule for the Work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative take necessary measures to complete the Work within the scheduled time. Do not change the schedule without notifying the Departmental Representative.
- .2 Include, in this schedule, the following information:
 - .1 Material lead time.
 - .2 Modernization time for each elevator.
 - .3 Final adjustment and finish-up period.
 - .4 Proposed progress billing schedule.

1.10 Occupied Building

- .1 Make allowances for the Work being carried out in an occupied building.
- .2 Take proper care to avoid unnecessary noise, clutter or obstruction in the corridors and arrange for storage of materials and tools where they will cause minimum inconvenience.
- .3 Do not use solvents or other products in quantity that is objectionable to building tenants.
- .4 Where excessive noise or obstruction is unavoidable, make arrangements with the Departmental Representative to complete that portion of the Work at a mutually agreed time and include for overtime costs. Overtime work will be required where in the reasonable judgement of the Departmental Representative building operations are being affected or tenants are being disturbed including:
 - .1 Noisy work that is clearly audible outside of the work space.
 - .2 Work generating fumes or noxious odours such as may arise from welding and glueing.
 - .3 Disruptive work involving moving large materials through the tenant spaces.
- .5 Normal working hours to be 8:00 AM - 4:00 PM each Monday through Friday other than International Union of Elevator Constructors holidays. Staff the Work with a minimum of two employees each day for the duration of the project, except as explicitly directed otherwise by these Specifications or by the Departmental Representative.

1.11 Protection of Work and Hoistways

- .1 Comply with Canadian Code for Construction Safety and the Provincial Construction Safety Act.

- .2 Provide a partition in the hoistway between the elevators being modernized and any adjacent operating elevator during the course of the Work. Partition to be securely fastened in place to prevent movement as elevators travel in the hoistway. Partition to run from top to bottom of hoistway and front to rear of hoistway.
- .3 Erect hoarding at each floor where there is an unlocked elevator hoistway door. Install plywood hoarding at landing entranceways from floor to ceiling. Plywood to be a minimum of 13 mm thick. Hoarded work space to be at least as wide as the elevator entrance opening and should create a work space inside hoardings of at least 1220 mm deep while not restricting passenger movement through adjacent hallway. Securely fasten hoarding to wall.
- .4 Upon removal of hoardings and partition make good all damage to surfaces of walls, floors and ceilings.
- .5 Use hoarded entranceways, and not the in-service elevator, for movement of equipment or garbage.
- .6 Protect existing floors by covering with 13 mm plywood and tarpaulins as a minimum, when removing or delivering materials.
- .7 Protect finished work against damage until take-over. Protect premises against spread of dust and dirt beyond work areas.
- .8 Protect occupants and other users of site from all hazards.
- .9 Do not remove partition or hoarding until Work is complete and approval is given by the Departmental Representative.
- .10 Confirm that any existing structural beams are suitable before lifting.

1.12 Definition of Terms

- .1 The term "Code" as used herein refers to Canadian Standards Association publication ASME A17.1-2010/CSA B44 10 Safety Code for Elevators and Escalators including any Updates in effect.
- .2 All of the terms in the specifications have the definitions given in Code.
- .3 The term "provide" or "furnish" as used herein, means to supply and install new equipment.
- .4 The term "refurbish" as used herein, means the provision of all labour, modifications, parts, etc., which are needed to return the component to as-new operating condition, complying with Code and suitable for intended use.
- .5 The terms provide, supply, refurbish etc. may be used with singular nouns but in such cases are defined to apply to all elevators and all equipment as is necessary to complete the Work to first class standards.

1.13 Standards

- .1 Perform Work to applicable standards including:
 - .1 ASME A17.1-2010/CSA B44 10 Safety Code for Elevators and Escalators including Appendix E.
 - .2 CSA C22. No.77 Motors with Inherent Overheating Protection.

- .3 CSA C22.2 No. 141 Unit Equipment for Emergency Lighting.
 - .4 CSA Standard B44.2 Maintenance Requirements and Intervals for Elevators, Escalators, Dumbwaiters.
 - .5 Elevating Devices Code Adoption Document, The Ontario Elevating Devices Act and Regulations and any active T.S.S.A. rulings.
 - .6 C22.1 Canadian Electrical Code, particularly Section 38.
 - .7 CSA B651-04 Accessible Design.
 - .8 Canada Labour Code, Part 2, Occupational Safety and Health Regulations including Section 13.13.
 - .9 Occupational Health and Safety Act including Section 109 of Ontario Regulation 213/91 (finished elevator installations are to have appropriate guards and be Health-and-Safety-regulation compliant with respect to physical and electrical hazards to persons in the elevator machine rooms including guarding of ropes in secondary).
 - .10 ASME A17.5-2011/CSA B44.1-11 Elevator and Escalator Electrical Equipment.
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- .2 Utilize materials as specified in every respect and with at least a three (3) year history of stable operation. Demonstrate these requirements prior to the awarding of a contract, if requested.

1.14 Measurements .1 Before the execution of the work, verify all dimensions with the actual site conditions.

1.15 System Description

- .1 The elevator system consists of five (5) overhead machine traction elevators.

Elevator: A - West Service
B - East Service

Installation No.:	10698	10699
Class:	Passenger	
Capacity:	4000 lbs C-1 loading	
Rated Speed:	350 fpm	
Floors Served:	03, 02, 01, M*, 2*, 3*, 4 - 8	(* = front and rear)
Car Door Opening:	48@ wide x 84" high, Two-speed side opening	
Cab:		6' 1" wide x 6' 3" deep

Machine: Geared (provide new), Overhead Traction
Hoist Motor: 45 HP (provide new)
Control: Simplex

Elevator: C - Left Passenger
D - Right Passenger

Installation No.:	10700	10701
Class:	Passenger	
Capacity:	3500 lbs	
Rated Speed:	500 fpm	
Floors Served:	G, 2 - 5	
Car Door Opening:	42@ wide x 84" high, One-speed center opening	
Cab:		6' 7" wide x 5' 4" deep

Machine: Gearless (refurbish), Overhead Traction
Hoist Motor: 39 HP
Control: Duplex

Elevator: E - Centre

Installation No.:	10702	
Class:	Passenger	
Capacity:	2000 lbs C-1 loading	
Rated Speed:	500 fpm	
Floors Served:	03, 02, 01, M, 2 - 8	
Car Door Opening:	42@ wide x 84" high, One-speed center opening	
Cab:		5' 10" wide x 3' 6" deep

Machine: Gearless (refurbish), Overhead Traction
Hoist Motor: 21 HP
Control: Simplex

1.16 Control and
Operation

- .1 Provide microprocessor-based duplex or simplex operation to fully coordinate the elevator for efficient operation. Arrange dispatching software to be capable of assigning hall calls based on a composite of weighted criteria. Include sufficient parameters for assigning cars to answer hall calls, as to produce average and maximum call registration times as herein specified. Include as assignment criteria:
 - .1 Calculate total time for each elevator, summing all trip phenomena (current car calls, assigned hall calls, etc.) to be encountered in reaching the particular destination landing. Include times for accelerations, running, slowdown and levelling, door operating times, door open dwell times and anticipated passenger transfer times.
 - .2 Evaluate the suitability of each car of a group, at least five times per second. Continue the sequence of re-evaluations until the last possible moment, in keeping with requirements for advanced and chime signals.
- .2 Normally, park one car at first floor and designate the second a free car, parked at landing last served.
- .3 Arrange idle free car to answer landing calls either above or below landing at which car is standing except first floor landing calls.
- .4 When free car is clearing calls, automatically start the other car, parked at first floor, to answer landing calls under the following conditions:
 - .1 Registration of up call 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 Inability of free car to clear all registered landing calls within approximately forty (40) seconds, or to move in response to registered landing calls within this time limit.
- .5 Arrange each car so that momentary pressure of one or more of its car buttons causes car to start.
- .6 When the car has been started, either in response to its own car button calls or to landing calls, respond to its own car button calls and to landing calls registered for direction in which car is travelling in order in which landings are reached, irrespective of sequence in which calls were registered. When travelling down the car will not respond to up calls, but these will remain registered and be answered on the next up trip.
- .7 Allow only one car to stop in response to any one landing call.
- .8 Return first car to clear all its calls to the first floor.
- .9 Should all cars finish their calls at the first floor, designate one car the free car.
- .10 If no car buttons are pressed and a car starts up in response to several down calls, it shall proceed first to the highest down call and reverse to collect other down calls. Similarly, up calls shall be collected when the car starts down in response to such calls.

- .11 If the car stops for a landing call and a car button is pressed within a pre-determined interval thereafter, corresponding to the direction in which the car is travelling, the car shall proceed in the same direction regardless of other landing calls registered.
- .12 If down landing buttons are pressed while the car is travelling up, the car shall not stop at these landings, but shall allow these calls to remain registered.
- .13 After the highest car and landing calls have been answered and the door interlock circuit is established, the car shall automatically reverse and respond to down car and landing calls.
- .14 Provide a time relay to hold the car for an adjustable interval at landings at which stops are made to enable passengers to enter or leave the car.
- .15 Cause the car to start before this time upon registration of a car button for another landing.
- .16 Permit a car to be registered to establish direction of travel when car has answered the furthest call, even if other landing calls are registered.
- .17 If a car is removed from service arrange other car to answer its own calls as well as all landing calls.
- .18 Arrange departure of cars from first floor to provide adjustable timing between cars leaving first floor.
- .19 Do not start car unless the car door is in the closed position and all hoistway doors are locked in the closed position.
- .20 Opening the emergency stop switch shall not cancel registered calls and after the switch is closed the car shall continue to answer calls in the normal manner.
- .21 Provide the elevator with a self-levelling feature that will automatically bring the car to the floor landings. Self-levelling shall, within its zone, be entirely automatic and independent of the operating device, shall correct for over travel or under travel and shall maintain the car within 10 mm of the landing irrespective of load and direction of travel.
- .22 The main floor as described in this operation is Ground floor.

1.17 Phase I Emergency
Recall Operation

- .1 Provide for all cars emergency recall service which will be initiated automatically and manually by any recall switch. When recall has been initiated:
 - .1 The elevator controlled by the recall switch and on automatic operation, including independent service operation, shall return directly to the recall level where the doors shall open and remain open. The elevator shall not respond to the landing or car call buttons. Travelling to a terminal landing first and then reversing to travel to the recall level is not acceptable.
 - .2 Include for connecting the fire alarm signal through the recall switch.
 - .3 Provide Recall by Machine Room Fire Sensor, Including Sensor at Machine Room Connection to and from Fire Panel.

1.18 Phase II Emergency

- In-Car Operation .1 Provide in-car emergency service for each elevator initiated by a key switch located in the car station. The switch shall be marked "OFF - HOLD - ON" and the key shall be removable in the OFF and HOLD positions. The switch shall become effective in initiating in-car emergency operation when in the "ON" position, provided the emergency recall operation is in effect and the car has returned to the recall level.
- .2 Provide two-way communication for firefighter=s between each elevator and the central alarm and control facility of the building. Provide the lobby fixture and run conductors required to accomplish communication to an accessible point inside the building (CSA B44 2.27.1). Use of an Integrated system for passenger and Firefighter=s communication, such as Webb OEM telephones with LS-250 Rescue stations is acceptable.
- .3 Include flush mounted speaker grills and microphones in the ceiling of each cab and provide a master station located at C.A.C.F in the building.
- .4 As an alternative to providing a complete intercom system, utilizing the telephone auto-diallers as communication between the CACF and each cab is acceptable. This alternative requires the elevator contractor to provide related consolidation equipment to achieve direct dialling to each cab, given that only one telephone line will be provided to the elevator machine room.
- .5 Supply and install all necessary conduit and wiring.
- .6 Allow for required engraving in car to be bi-lingual French and English language. Engraving to shown on shop drawings.
- .7 For Elev. A and B provide extra requirements required for designation as dedicated Firefighter=s car.

1.19 Emergency Power Operation

- .1 Arrange equipment to suit building emergency power arranged as follows:
- .1 Elevators on emergency power to be: one of elevators C and D and additionally at all times elevators A and B.
- .3 The emergency power will be provided on the same lines and the same disconnect as the normal power.
- .2 Arrange elevator circuits, wiring and controls so that:
- .1 All cars are automatically and sequentially brought to the main floor.
- .2 Any car delayed by some malfunction is by-passed.
- .3 After all cars are at the main floor with their doors open, arrange that one elevator as selected by a manual switch will run normally answer hall and car calls. This elevator to have its main floor hall lantern and position indicators illuminated.
- .4 The normal safety devices including door open buttons and door protective devices, remain operational.
- .5 Ensure the elevator control equipment and motor drive are not damaged on transfer to and from emergency power.
- .3 Include a pilot light to indicate emergency power operation.

- .4 Provide a stainless steel faceplate, or modify the existing plate, in the location of the existing selector switch and engrave the words "ELEVATOR EMERGENCY POWER".

1.20 Temporary
Overlay System

- .1 Provide temporary overlay system so keep emergency recall and emergency power signals operational for the duration of the construction project.

1.21 Shop Drawings.1

- Before beginning work, prepare all drawings necessary to show the general arrangement of the elevator equipment and other data which is called for and are to be submitted for review. Provide these drawings within two (2) weeks of notification of award of contract.

- .2 Drawing review is for the sole purpose of ascertaining conformance with the general design concept and does not mean approval of the design details inherent in the shop drawings, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract including this specification.

- .3 Use metric units of measurement.

- .4 Submit four (4) copies and one (1) reproducible (sepia) copy of each shop drawing for Departmental Representative's review.

- .5 Indicate to scale on layout drawings:

- .1 Driving machine, controller, governor and all other components in machine room.

- .2 Car, counterweight, sheaves, supporting beams, guide rails, buffers and other components in hoistway.

- .3 A section view of the hoistway including elevation of each floor served, pit depth and overhead.

- .4 Location of circuit breaker, switchboard panel or disconnect switch, light switch and feeder extension points in machine room.

- .5 Location in hoistway or machine room for connection of travelling cables for car light and communication system.

- .6 Locations and size of trap doors and access doors and load on hoist beam and location of trolley beams.

- .7 Heat dissipation of elevator equipment in machine room.

- .6 Indicate on general arrangement drawings:

- .1 Detailed drawing showing all fixtures, position indicators, push buttons, car operating stations, corridor control panels, and any other special fixtures pertaining to the project.

- .2 Include catalogue illustrations of operating and signal fixtures.

- .7 Do not commence manufacture or order materials before shop drawings are reviewed.

1.22 Record Drawings
and Data

- .1 Before final acceptance of the elevator, provide three (3) sets of reproducible as-built wiring diagrams as well as three (3) sets of all final issue shop drawings. All drawings to be laminated or enclosed in plastic protectors and marked "as-built". Provide layouts stamped by a Professional Engineer registered in the province of Ontario.
- .2 Provide one soft copy of the above information in AutoCAD format with print file.
- .3 Mark up all field changes or additions to original wiring diagrams in red.
- .4 Submit drawings and data in accordance with General Instructions specification, if distributed with this tender.

1.23 Maintenance
Information

- .1 Provide three (3) copies of manufacturer=s instructions and operation and maintenance manuals including PDF version on disk.
- .2 Include full Maintenance Control Plan (MCP) including the following maintenance data:
- .1 Description of elevator system's method of operation and control including motor control system, door operation, emergency recall operation and special or non-standard features provided.
- .2 Replacement parts list.
- .3 Include all wiring diagrams for all equipment on controllers.
- .4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which detail the following:
- lubrication products and schedules
 - trouble shooting procedures
 - adjustment techniques
 - operational checks.
- .5 Spare Parts:
- List recommended spares to be maintained on site to ensure optimum efficiency
 - List all special tools and appropriate unique applications.
 - Detail manufacturer and supplier names and addresses.
- .3 Include in the manuals a copy of the registered design submission and safety authority inspection reports.
- .4 For a fifteen (15) year period following acceptance of Work, provide further information and parts that is required for the safe and efficient maintenance of the elevator equipment, including any solid state equipment or devices supplied under these specifications. Fee for parts, is agreed to be manufacturing cost plus 40%. Fee for

information is agreed to be the published Professional Engineers of Ontario rate applied to hours actually required.

1.24 Maintenance
Service

.1 Include full parts and labour maintenance from contract award, during the construction period (from the time the first elevator is removed from passenger service until the time the last elevator is restored to passenger service) and for the subsequent 12 month warranty period. Provide, as a minimum, maintenance of each elevator as described below and per the maintenance specification distributed with this tender.

.2 Carry out maintenance inspections and tests in accordance with PWGSC=s Master contract, CSA Standard B44.2-10 Maintenance Requirements and Intervals for Elevators, Escalators, Dumbwaiters, Amendment 225/07, The Ontario Elevating Devices Act and Regulations and any active T.S.S.A. rulings.

1.25 Quality of Work

.1 Perform the work using mechanics skilled in the installation of elevator machinery and elevator entrances.

.2 Guard and protect the hoistway, from commencement to completion of the work.

.3 Comply with all applicable provisions of all federal, provincial and local labour laws and with all applicable union regulations contained in the union agreement, including any travelling and incidental expenses involved in the work.

1.26 Power Supply

.1 Make all necessary modifications to the electrical services relating to the elevators such as supplementary disconnect devices and connections to the controllers.

.2 Allow for modifications to the building power supply required to accommodate the installation of the new elevator equipment.

.3 Carry out electrical modifications by a Licensed Electrician and arrange and pay for inspection by hydro utility as required. Provide a copy of utility permit and to Departmental Representative.

1.27 Use of Elevators
By Handicapped

.1 Unless specified within otherwise, arrange any new controls and fixtures to be easily reached and operated by disabled persons. Meet all requirements of Appendix "E" of the CAN/CSA-B44 Safety Code for Elevators.

.2 Provide voice annunciation indication of each floor, when served and of car direction. Provide volume control adjustable from behind car station. Provide high-power speakers, minimum of two (2) per car so no distortion is readily noticeable to passengers. Provide sample of annunciations, to be in feminine French and English languages, with shop drawings.

1.28 Coordination

.1 Coordinate work of all trades required to complete this contract.

1.29 Markings

.1 Make all identifications and instructions in English and French or with international symbols.

1.30 Storage and

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- Handling_____
- .1 Store materials in elevator machine room or other area designated by the Departmental Representative in a manner offering adequate protection against bodily injuries, interference with work in progress or damages to work already completed.
 - .2 Adequately protect painted or finished surfaces of all materials delivered to the site.
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- ## PART 2 - PRODUCTS

- ## 2.2 Electrical Wiring
- ### Conduits and Fittings

- .1 Furnish and install all new insulated wiring to connect all parts of the equipment including travelling cables, all wiring in hoistway and wiring to new components on car top.
- .2 Use steel set screw type fittings where electrical metallic tubing is used.
- .3 Provide a communication system junction box on the outside of the controller appropriately identified. Provide shielded wiring from the assistance button in car and the speaker in the car to a junction box located at controller in machine room.
- .4 Provide a separately identified box for the fire alarm connection.
- .5 Include at least 10% spare conductors in each cable. Tape and legibly identify all spare wires.
- .6 Include at least two (2) pairs of shielded wires for audio, video or other electronic equipment - minimum 20 gauge.
- .7 Do not parallel conductors to increase current carrying capacity unless individually fused.
- .8 Install a separate green bond wire in all raceway, including EMT and flexible conduit.
- .9 Provide additional disconnect switches and wiring if required by Code, to suit new machine room layout.
- .10 Include wiring, and connections to elevator devices remote from hoistway and between elevator machine rooms.

- .11 Connect all wiring where required to building fire alarm system.
- .12 Limit use of flexible conduit on car top to items that require movement or periodic adjustment.
- .13 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Wiring shall be run in metal conduit, metallic tubing or wire ducts.
- .14 When using conduits or troughs through floor, extend conduit or trough at least 100 mm above floor.
- .15 Do not run conduit or wiring along the pit floor. Install all conduit and wiring a minimum of 150 mm above pit floor.
- .16 Any suitable existing conduit or trough may be retained.
- .17 Use type ETT travelling cables. Use travelling cables with rayon braid.
 - .1 Include at least two (2) pairs of shielded wires for audio, video or other electronic equipment - minimum 20 AWG.
 - .2 Provide minimum break strength of 3000 Kg.
 - .3 Provide one (1) RG6/U coax,75-ohm
- .18 Suitably suspend the travelling cables to relieve strain in the individual conductors.
- .19 Run 600 volt wiring in electrical metallic tubing or other galvanized steel raceway. Include a covered ground wire same size as feeders in the raceway.
- .20 Fabricate wiring that is run in conduit or tubing to Table 6 of CEC Part 1.

2.3 Sound Isolation

- .1 Provide new resilient Neoprene pads to effectively isolate new machines and motor drives from machine room floor. Design for Transmissivity of less than 10% at full speed and full load.
- .2 Prevent lateral displacement of new machines and motor drives.

2.4 Lubrication

- .1 Include means of lubricating bearings, requiring periodic lubrication.
- .2 When used, provide grease fittings which fit same gun.
- .3 Where grease cups are provided, use automatic feed compression type.
- .4 Provide visible and easily accessible lubrication points.

2.5 Roller Guides

- .1 Equip car and counterweight with new roller guides mounted on top and bottom of car and counterweight frames. Make each roller separately spring-loaded. Provide minimum diameter of 250 mm for car, and 150 mm for counterweight or smaller diameter with 4-wheel guides.
- .2 Provide each guide with durable, 90 durometer, oil resistant polyurethane rollers to run on three finished rail surfaces.

- .3 Do not lubricate guide rails. Maintain each roller on its respective guide in uniform contact with rail surface at all times by means of substantial adjustable springs.
- .4 Provide guide operation, which is inaudible to passengers in car or outside hoistway with car operating at rated speed and car fan turned off.
- .5 Use roller tire material which will not develop flat spots after standing idle for 24 hours at 32 degrees C.

2.6 Guide Rails
and Brackets

- .1 Inspect all existing rail brackets to verify that they are securely fastened to the building structure. Provide any required new brackets and tighten any loose brackets.
- .2 Check all guide rails for plumb and parallel within maximum deviation of 1.6 mm per any 6,000 mm section and 0.1 mm per 25 mm section. Adjust to comply.
- .3 Repair any damage to rails including damage by safety applications. Remove corrosion and re-paint any painted portions of rails.

2.7 Rope Hitches
and Sheaves

- .1 If suitable with contractor=s new arrangement, any existing car top sheaves and rope hitches can be retained and refurbished.
- .2 Service sheaves to ensure smooth, low friction and quiet movement under load, including provision of required bearings.

2.8 Hoist and
Compensation Ropes

- .1 Hoist ropes and compensation on retained gearless machines may be retained provided they meet the minimum requirements of CSA standards at time of project substantial completion and provided that rope replacements are not prorated or excluded in contractors long-term maintenance proposal (to be submitted at time of tender).
- .2 Other than above, provide new hoist ropes with fibre core from same factory production run.
- .3 Configure diameter and number of ropes to duty of elevator and in accordance with good practice and Code.
- .4 Provide springs on the counterweight ends of hoist ropes.

2.9 Buffers

- .1 Refurbish car and counterweight buffers including scrape of rust, inspect and paint. Note defects in writing to Departmental Representative.
- .2 Provide new buffer oil.
- .3 Test buffers to standards of Code.
- .4 Verify alignment of buffers to strike plates.
- .5 Provide new buffer data plates, if required.

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- 2.10 Counterweights .1 Retain existing counterweight assemblies as needed to provide smooth quiet operation. Thoroughly inspect counterweight for broken welds, cracks or loose bolts. Refurbish where required.
- .2 Provide steel retaining arrangement to prevent counterweight from leaving guide rails in event roller guide assemblies leave their attachments. Retaining arrangement to be fastened to counterweight frame independent of primary guiding means.
- .3 Provide extra or remove existing counterweights bricks, as required, to suit new equipment and car interiors.
- .4 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.
- .5 Provide maximum runby sign on counterweight guard or pit wall in vicinity of counterweight.
- .6 Provide counterweight guards where access is not otherwise protected by compensation - to Code requirements.
- 2.11 Safeties and Governors .1 Test under Safeties at governor tripping speed at completion of project and enter date of test in log book.
- .2 Existing governors may be retained if suitable for contractor=s new equipment. If retained, disassemble and regrease bearings to provide low friction movement. Spin test and seal trip speed. Perform a pull through force test in accordance with Code. Otherwise, provide new governor assembly and rope.
- .3 Provide new or refurbish tension sheave in pit if suitable with contractor=s new arrangement.
- 2.12 Drive Machines .1 Retain existing gearless machines for Elev. C, D and E and refurbish.
- .1 Provide all new OEM brushes in rotating electrical equipment. Refurbish holders for freeness and proper tension.
- .2 Thoroughly blow out interiors.
- .3 Inspect and repair rotating electrical equipment connections.
- .4 Dismantle the existing brake, and as required to achieve proper long term operation, replace the brake cores, brake coils and brake shoes. Rebush the brake bearing points if necessary and replace any worn pins.
- .5 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.
- .6 Provide a brake setting data plate to code requirements.
- .7 Replace bearings showing scoring or other visible or audible damage. Repack all greased bearings.
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- .8 Check armature air gap clearances and equalize.
 - .9 Turn and undercut commutator to obtain a smooth finish.
 - .10 Refurbish drive sheave grooves as required to ensure Code-required traction and so that new ropes sit substantially flush in the grooves, as determined by holding a straight edge across the ropes.
 - .11 Test the insulation by Megger, at least 500 volts, to confirm insulation of 1 M ohms. Refurbish as required to achieve this resistance including re-wind and re-laquer.
 - .12 Provide 50 mm high, 12 gage steel, kick plates to protect rope opening in the floor slab.
 - .13 Engage the services of a sub-contractor experienced in the repair of elevator gearless motors to refurbish the motors. With as built drawings, this subcontractor to provide a letter of guarantee that the motor has been professionally refurbished to the above and to first class-standards, suitable for long term use without further major service.
 - .14 Install locking wires.
 - .2 Provide new geared machines for Elev. A and B.
 - .1 Dowel all moveable components on any machine that is to be dismantled for transport to the machine room.
 - .2 Provide single worm geared traction machine with motor, brake, gearing, and driving sheave mounted on or integral with cast iron or steel bedplate.
 - .3 Use steel worm, integral with worm shaft with ball or roller bearing thrust unit to withstand worm thrust in both directions.
 - .4 Design to permit removal of thrust unit without dismantling machine.
 - .5 Hob gear from bronze rim and shrink fit or press and bolt to gear spider with fitted body bolts.
 - .6 Include means for lubrication and provide oil tight inspection ports for worm gear face, gear contact and gear mounting bolts.
 - .7 Design brake to be spring applied electromagnetically released and quietly operated by direct current. Clean and lubricate all brake pins.
 - .8 Press and key brake drum securely onto worm shaft.
 - .9 Manufacture traction sheave thick enough to permit at least one re-machining of traction grooves.
 - .10 Press and key sheave shaft into worm gear and traction sheave centre or fit integral traction sheave and worm gear centre to bearings on sheave shaft.
 - .11 Provide gearing which operates without discernable noise and which causes no noticeable vibration in the car.
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- .12 Minimize the size of cable holes in the machine room floor. Provide guards around cable holes.
- .13 Prevent lateral displacement of machine.
- .14 Sound isolate, using at least 30 mm thick, one-piece rubber pads.
- .3 Provide new AC motors for Elev. A and B.
 - .1 Provide new high efficiency, low slip motor designed for elevator service and recommended by manufacturer of motor drive as follows:
 - .2 Provide Class B, F or H insulation system rated for 50 degree Celsius temperature rise, or better. Conform to NEMA Standards.
 - .3 Provide 60 minute duty based on 180 stops per hour.
 - .4 Provide less than 3% slip at full load.
 - .5 Thermally protect motor.
 - .6 Provide high tensile (105,000 psi or better) steel shaft with 32 micro finish or better.
 - .7 Impregnate windings with insulation and bake to prevent absorption of moisture and oil.
 - .8 Provide not less than one megohm insulation resistance between motor windings and motor frame.
 - .9 Provide sealed bearings. Do not use motor bearings as thrust for worm shaft.
 - .10 Provide a rotor of die cast aluminum.

2.13 Up Overspeed and
Low Speed Protection

- .1 Equip elevators with a safety device to provide UP direction car overspeed protection.
- .2 Equip elevators with protection against uncontrolled movement outside of door zone.
- .3 Locate new safety devices in the elevator machine room behind the machines. Provide all hardware required to fasten safety device to machine room floor or machine bed plate including raising of existing machine bedplate if required. Use a fastenings and support design approved by a Professional Engineer.
- .4 Design safety device to act on lift ropes and not drive sheave.
- .5 Design safety device to be capable of setting repeatedly without damaging itself or the elevator machine or ropes.
- .6 Use device with mechanical (spring) application. Do not use devices which require pneumatic or hydraulic pressure to apply to ropes or sheave.

2.14 Motor

<u>Protection</u>	.1	Include manually reset integral overheating protection to CSA C22.2 No. 77-1988 of motors subjected to elevator service.
2.15 Direct <u>Current Supply</u> .1		Use rectifiers to supply direct current for elevator machine brake, control and operating equipment.
2.16 Solid State <u>Motor Drive</u>	.1	Provide solid state motor drive to include the following:
	.2	Convert 3 phase, 60 Hz AC to variable DC voltage for motor operation.
	.3	Use automatic closed loop control system.
	.4	Provide instant and noiseless response according to power required.
	.5	Include regenerative braking of motor during deceleration by feeding power generated by motor, back to ac power lines.
	.6	Arrange for stepless acceleration and deceleration and smooth operation at all speeds.
	.7	Design circuitry with redundant systems to fail safe.
	.8	Filter power supply to give essentially ripple free current.
	.9	Design solid state devices to handle 200% current to 30 s and 300% for 10 s.
	.10	Eliminate surges on the AC line which might cause blowing of the DC line fuses or which might cause trouble in other equipment connected to AC line. Filter DC.
	.11	Include disconnecting pole in DC motor armature circuit to prevent blowing fuses on loss of power while elevator is in any state of operation including regeneration.
	.12	After installation, modify frequencies emanating from rectifier drive which are objectionable to building tenants or which interfere with existing building systems.
	.13	Design tac motor to suit control system.
	.14	Automatically re-start equipment which has stopped due to ac power failure.
	.15	Withstand damage to system and avoid malfunction due to any variation of power supply.
	.16	Provide electronic feed back circuits to limit the current through the motor and solid state power devices.
	.17	Include means for dissipating the heat generated by the solid state power devices.
	.18	Include means to shut down the unit in the event overheating occurs.
	.19	Design drive to operate from the existing building 3 phase power supply.
	.20	Limit voltage distortion or notches to the standard of IEEE 519. Limit EMI through the use of shielding, efficient power conductor run and filters as required.

- .21 Limit Voltage Total Harmonic Distortion, measured at the disconnect switch providing elevator power, to 5%, and limit any individual harmonics to 3%.

2.17 Sheaves and
Supporting Beams

- .1 Thoroughly clean off and examine all sheaves and supporting beams.
- .2 If suitable to contractor=s new layout, existing deflector sheaves may be retained. If retained, refurbish as required including provision of new bearings to provide smooth quiet movement when rotated by hand.
- .3 Provide any new deflector sheaves, bearings and beams necessary to obtain the proper lead of the ropes to car and counterweight.
- .4 Provide sheaves of cast iron, accurately machined and grooved for the diameter of ropes used and supported by steel beams or channels furnished in place by Elevator Contractor.
- .5 Size any new sheaves larger than required to permit at least one regrooving.

2.18 Controller and
Cabinet

- .1 Utilize only elevator motion controllers from manufacturers with a minimum ten year history of elevator experience and with a minimum of 100 similar successful installations in Canada. Use optical encoder, non-proprietary versions.
- .2 Enclose the controller in enamelled, ventilated, sheet steel cabinet, with swing-type doors at front.
- .3 Provide relays and contactors particularly designed for elevator duty.
- .4 Provide a suitable communication system junction box on the outside of the controller and identify it accordingly. Provide a separate identified box for the fire alarm connection and emergency power signal.
- .5 Cord all field wiring and insulate from metal contact.
- .6 Permanently identify all switches and relays.
- .7 Provide protection against reverse and open phasing of main feeders.
- .8 Include properly sized primary and secondary fuses for each transformer used in the controller.
- .9 Provide new solid state controller equipped with microprocessor controls and self-diagnostic features.
- .10 Manufacture microprocessor specifically for control of elevators.
- .11 Provide relays and contactors particularly designed for elevator duty.
- .12 Mount all controller components, including resistors, inside the cabinets. Do not mount components on controller doors or removable panels.
- .13 Govern motion of cars by means analysing real position of car in hoistway. Position device shall be positively connected to the car by mechanical or electrical means.

Travelling to a terminal landing for recycling is not acceptable. Stepper relays are not acceptable.

- .14 Do not employ components or controller logic which will disable or otherwise alter the operation of the elevator after a pre-determined number of starts, door cycles, etc.
- .15 Use microprocessors for all logic related functions such as dispatcher, car controller and motion control. Provide crystal regulated frequencies. Provide a dispatching program in ROM, with at least 40% spare capacity. Power each processor from a separate power supply. Isolate the inputs and outputs by optical devices or relays.
- .16 Use easily removable printed circuit boards for all solid state devices other than high power SCR's and rectifiers. Use gold plated edge connectors. Protect circuits from oxidation. Make all wiring connections through properly dimensioned pads.
- .17 Design solid state circuits to operate in the anticipated environment. Provide means to restart the elevator system efficiently in the event of power interruption. Incorporate noise suppression devices in power supplies, inputs and outputs.
- .18 Ensure that the equipment is capable of operating as intended, when the ambient temperature of the machine room is between 5E to 32EC.
- .19 To facilitate testing and troubleshooting, arrange control circuits to ground one side of the control power supply used for external circuits. (External circuits are those outside of microprocessors or solid state devices, such as relays, lights, limits, locks and buttons.) Arrange the design so that safety circuits are not compromised by accidental grounding of control circuits.
- .20 Install wiring runs neatly. Terminate wiring at studs or terminal strips, using connections that assure substantial electrical and mechanical integrity. Identify all major components exactly as they are indicated on wiring diagrams. Use engraved lamicaid or metal tag mounted immediately adjacent to the component.
- .21 Provide battery back-up for all circuits containing volatile memory, which will retain all information for at least 24 hours without regular power.
- .22 Provide fully non-proprietary version of all control equipment including:
 - .1 All required diagnostics, maintenance and adjustments are Aon board@.
 - .2 All programming and diagrams required for long-term maintenance are provided with the controller.
 - .3 The controller will not shut down or alter its functionality in any way after a pre-determined increment of time or use.
 - .4 Any elevator contractor shall be allowed to purchase parts, supplies, diagrams, support or training directly from the factory at the same cost level as the original installer. A published price list shall be supplied with the controller.
 - .5 Parts including circuit boards shall be available for direct purchase from the factory in numbers and not on an one-for-one Aexchange only@ basis.

2.19 Terminal
Stopping Devices

- .1 Provide new automatic stopping device, arranged to bring car to a stop at the terminal landings independent of the primary device in the car.
- .2 Locate final limit switches in the hoistway, operated by the car and arranged to stop the car and prevent normal operation should the car travel beyond the zone of the normal stopping device.
- .3 Dowel final limits to rails.

2.20 Position
Transducer

- .1 Arrange the closed loop feedback power control to continuously monitor the actual elevator speed signal from the velocity transducer and compare it with the intended speed signal to verify proper and safe operation of the elevator.

2.21 Emergency
Lighting

- .1 Provide all new car emergency lighting with two (2) bulbs per car.
- .2 Provide new battery to provide general illumination in car and 10 Lx minimum illumination at operating panels for 4 hour minimum.
- .3 Include means of containing any leakage or spillage of electrolyte.
- .4 Arrange battery to supply alarm bell during power failure.

2.22 Car Frame

- .1 Thoroughly examine car frame for any cracks, bends or broken welds and repair where required.

2.23 Passenger
Car Enclosure

- .1 Provide cab design as distributed with this tender - ASK-2 and 3 for passenger elevators C and D and ASK-4 and 5 for other elevators.
- .2 Provide cab pads and hooks for elevators A and B.
- .3 Refurbish cab fans for quiet operation.
- .4 Provide complete new skin of brushed stainless steel on entrance walls, doors, fronts, headers etc of elevators C and D and patterned stainless steel for the other elevators.
- .5 Provide accurate weighing of cabs within three weeks of contract award and immediately notify project authority in writing.

2.24 Car Operating
Station

- .1 Provide all-new LED-illuminated stainless steel floor buttons, two operating panels per cab. Provide square buttons with braille to the left hand side, in accordance with project drawings project drawings.
- .2 Provide a key operated stop switch, an alarm button, door open and close buttons, three position key switch for in-car emergency service, indicator light and buzzer for emergency recall.
- .3 Make all identification engraved in upper or lower case, Helvetica medium, minimum 10 mm filled with red or black enamel, as required.

- .4 Replace existing in-car key switches with new round-barrel switches.

2.25 Car and Hoistway
Door Operator

- .1 Provide high speed, heavy duty, electric door operator, with solid state feedback (closed loop) control. Provide door open speed of at least 2 fps and motor power of 2 HP.
- .2 Provide electrical cushioning at each end of travel.
- .3 Locate controls for the adjusting and regulating of the door operator acceleration, deceleration and operating speeds adjacent to the door operator on top of the car cab.
- .4 Provide a gate switch for the car door operated by a roller attached to each door panel - provide two gate switches per car.
- .5 Provide a system of direct drive door arms and levers, to move door panels.
- .6 Include adequate circuits for controlling door motor torque to provide quiet, smooth and reliable door operation under varying hoistway-lobby pressure conditions.
- .7 Dowel gate switch mounting bracket.

2.26 Car Door
Protective Device

- .1 Provide new door protection devices capable of sensing passengers in three dimensions - between, and in front of, the edges.
- .2 Provide solid state, electronically operated door reversal device on the leading edge of each car door panel. The device shall contain systems specifically designed for the application and enclosed in an insulated chassis.
 - .1 Include no moving parts.
 - .2 Include solid state electronic devices to provide long term reliable operation.
 - .3 Upon failure of the device, shut the car down at the next available floor, with doors in the fully open position.
 - .4 Provide totally silent operation.
 - .5 Include visible diagnostics on the device to permit verification that the unit is functioning.
 - .6 Install all components behind the door edge, so as to provide a clear opening and present a clean architectural appearance.
 - .7 Design the device to provide a zone of detection - minimum 80 mm in advance of the leading edge of each car door and arrange the operation as follows:
 - .1 Trigger the protection system when any object is located in the entrance and cause the door to reopen without engaging the object.
 - .2 Permit the protection system to be triggered throughout the full travel of the doors.
 - .3 After elapse of the normal door open dwell time, provide a limited door reversal operation. Arrange the operation so that the door retracts sufficiently to permit only the immediate entering passenger to pass. Continue closing of the door after the passenger leaves the zone of detection.

2.27 Struts

- .1 Thoroughly examine all headers and strut angles in hoistway for proper fastening to building structure.
- .2 Securely fasten any loose headers or struts.

2.28 Car Doors,
Hangars and Tracks

- .1 Retain and refurbish existing car doors, hangars and tracks.
- .2 Adjust car doors for smooth and quiet operation.

2.29 Hoistway
Hangars Locks,
Tracks and Closers

- .1 Retain existing hangers and tracks. Refurbish where required to provide smooth and quiet operation.
- .2 Provide new door closing system with sill mounted closers or heavy-duty spirators. Adjust to provide consistent closing force, within 10%, across all cars and all landings.

- .3 Retain and refurbish locks including new contact surfaces.
- .4 Provide all new air cord and door equipment and new relating sheaves complete with retainers to keep air cord in place.

2.30 Hoistway
Entrances

- .1 Retain existing entrances.
- .2 Examine and adjust all entrance assemblies for secure fastening.

2.31 Hoistway Frames
and Doors

- .1 Retain existing hoistway doors and frames, clean and refurbish existing metal entrances including but not limited to; doors, frames, sill and jambs. Thoroughly examine for broken welds and repair as required.
- .1 Use masks and barriers to prevent staining and contamination of adjacent materials and finishes.
- .2 Remove all coatings by solvent base chemical stripper only.
- .3 Remove stripper residues by whipping with alcohol and rags.
- .4 Treat the cleaned bronze/brass; polish smooth surfaces.
- .2 Adjust all hoistway doors for smooth and quiet operation.
- .3 Replace worn astragals.
- .4 Provide code-compliant retainers, top and bottom.
- .5 Adjust door equipment so that door-to-frame clearance meets current Code requirements.
- .6 Provide lunar-key access at all floors.

2.32 Hoistway Sills

- .1 Retain existing sills. Check all sills for proper fastening.
- .2 Completely clean and scrape the full length of the sills to achieve smooth and quiet guide operation.

2.33 Fascia and
Toeguards

- .1 Inspect, adjust and tighten existing fascias from bottom floor to underside of top floor, including any passed floors. Paint fascia with rust resistant paint.
- .2 Paint toeguards with rust resistant paint.

2.34 Identification

- .1 Provide 50 mm numerals on all elevator equipment.
- .2 Provide all necessary engraving on faceplates as required by the Departmental Representative, Helvetica medium, upper and lower case.

2.35 Independent
Service

- .1 Provide independent service operation.

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| | .2 | On independent service, remove the car from the automatic supervisory control system. |
| | .3 | Arrange the circuits so that the car does not respond to hall calls. |
| | .4 | Cause the car to park with its doors open. |
| | .5 | Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up. |
| | .6 | Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move. |
| | .7 | Render inoperative the normal door protective devices. |
| | .8 | Cancel all registered car calls when the direction reverses or a car call is answered. |
| <u>2.36 Car Position Indicator</u> | .1 | Retain car car-position indicator faceplates. Provide new LED-illumination with bulbs rated to 100,000 hours. |
| <u>2.37 Hall Position Indicator</u> | .1 | Provide led illumination behind lenses of existing hall position indicators. Provide new LED-illumination with bulbs rated to 100,000 hours. |
| <u>2.38 Car Arrival</u> | .1 | Alter existing lantern systems to sound once for UP arriving car, and twice for DOWN. Provide clear tone at 30 dBA measured 1 meter from fixture. |
| | .2 | Include new chimes and led illumination. |
| <u>2.39 Hall Buttons</u> | .1 | Provide all-new hall buttons to match new car buttons. |
| | .2 | Illuminate each button in the hall fixture when pressed to indicate a call has been registered and maintain illumination until the call has been answered. |
| <u>2.40 Fixture Fastening</u> | .1 | Fasten all fixture faceplates including car operating station, with tamper proof screws. |
| <u>2.41 Signal Illumination</u> | .1 | Illuminate signal fixtures with intensity which produces distinct and well defined indications in daylight or dim conditions. |
| <u>2.42 Top Of Car Operation</u> | .1 | Provide on car tops a new single operating fixture containing the following: an emergency stop switch, continuous pressure buttons for operating the car and a switch for making the buttons on top of the car operable. Operation from top of the car shall be obtained by simultaneous, continuous pressure of the appropriate direction button and a safety operating button after these buttons have been made effective. Locate control box to Departmental Representative's approval. |
| | .2 | While on Top Of Car Inspection Operation, arrange for the following: |
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- .1 Movement of car shall not be possible unless all safety chain contacts are closed.
- .2 Disable automatic levelling, power door operation and signals.
- .3 Car speed to be between 100 fpm and 150 fpm.
- .3 Provide car top railings to TSSA Director=s Order #245-10.

2.43 Work Lights and Receptacles

- .1 Provide new car top light fixtures.
- .2 Provide one fixed and one new movable light per car top. Guard with metal cage and permanently to 110 volt source at car top.
- .3 Provide a duplex, GFI receptacle at the car top.

2.44 Keys

- .1 At completion of Work turn keys over to Departmental Representative properly identified. Provide six (6) copies of each key.
- .2 Provide key rings and engraved lamicoid tags, identifying use of key.

2.45 Hoistway Access

- .1 Provide access at each landing door by lunar key unlocking device.
- .2 Provide new car top access at the top landing, by Hoistway Access Switches and circuitry.

2.46 Load Weighing Devices

- .1 Provide a new automatic load weighing device able to measure car load with 5% accuracy. Device to monitor deflection of spring at rope hitch.
- .2 Design controller to utilize load weighing information as follows:
 - .1 Prevent a fully loaded car from answering registered hall calls.
 - .2 Assign hall calls to the most available car and controlling traffic analytically.
 - .3 Dispatch a parked car from the main floor as soon as the car has been loaded to a pre-set setting.
 - .4 Adjust the load weighing device to ensure that it will operate over the required range of 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 leaving a floor.
 - .7 Provide Anti-Nuisance operation which will cancel car- registered calls when the number of calls is not reasonably proportional to the cab load.

2.47 Monitoring,

Control and Diagnostics

- .1 Equip control system with system for monitoring, control and diagnostics from the two main elevator machine rooms. Provide all conductors including run external to hoistway.
- .2 Provide connections and modem for remote dial-up CRT visual display of interactive elevator functions.
- .3 Equip controller with necessary interface software logic program to monitor elevator functions and record events to storage.
- .4 Provide one (1) working computer, loaded with licensed software, with the following capabilities.
 - .1 Real-time display screens.
 - .2 Online Help to provide a complete content-sensitive help program shall be provided to give the users hints and explanations of the current task.
 - .3 Summary to give a brief description of the system, including the job number, job name, number of cars, number of landings, number of openings per landing for each car, car labels, and landing labels.
 - .4 Individual Flags - This screen shall display a list of the selected car's internally generated computer flags for diagnostics.
 - .5 Graphic Hoistway Display - The Central Monitoring System shall display the elevator system hoistway. That is, users shall be able to view a graphical representation of the elevator hoistway. Including : Simulated Hoistway and Car Configuration
 - Individual Elevator Position
 - Individual Elevator Car Calls
 - Individual Elevator Direction
 - Individual Elevator Door Position
 - Individual Elevator Status of Operation
 - Individual Elevator Communication Status
 - Registered Up and Down Hall Calls
 - Controller Real-Time Clock Date and Time
 - .6 Emergency Notification - in case of unit shutdown, the system shall have the ability to page designated personnel to notify them of an emergency event.
 - .7 Reporting ability including malfunction events, Average Wait Time for elevators and total availability time for all units.
 - .8 The system shall provide a multiple level of password protection for the usage of the system.
 - .9 Monitor system parameters including calls per floor, calls per elevator, average waiting time and % calls answered in 30, 60, 90 and 120 seconds. Allow for graphical analysis of any parameter for any chosen time interval from the previous 180 day period.
- .5 Provide one (1) PC as described below. Locate in building managers office - no computer is required in the elevator machine room. Load with all required software. Provide:

- .1 Quad core processor.
- .2 1 TB capacity hard drive.
- .3 CD- RW drive.
- .4 15" nominal flat display.

2.48 Guarding

- .1 Finished elevator installation to have appropriate guards and be Health-and-Safety-regulation compliant with respect to physical and electrical hazards to persons in the elevator machine rooms. Comply with TSSA Best Practices document employing guarding integrated to the elevator machinery rather than fence type guarding.

PART 3 - EXECUTION

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| <u>3.1 Removal of
Old equipment</u> | .1 | Remove from site and dispose of all redundant elevator equipment. |
| | | |
| <u>3.2 Machine Location</u> | .1 | Retain machine location directly over hoistways. Provide any necessary bearing plates and transfer arrangement to accommodate the new machine fastenings to beams. |
| | | |
| <u>3.3 Arrangement of
Equipment</u> | .1 | Arrange equipment in machine room for clear passage into room. |
| | .2 | Design equipment for use in existing space for hoistway width, depth, overhead, pit and machine room. |
| | | |
| <u>3.4 Clearances</u> | .1 | Adjust equipment to attain Code-required running clearances including sill to sill clearances of 13 mm - 32 mm. |
| | .2 | Adjust door equipment to attain Code-required clearances including door panel to jamb clearances of 10 mm maximum. |
| | | |
| <u>3.5 Car Balancing</u> | .1 | Before final adjusting commences, statically balance the car so that, at the centre of the hoistway, the car hangs in the centre of the rails with the top roller guides removed. |
| | .2 | Carry out this test with the car doors closed and an empty car. |
| | .3 | Use iron or steel weights mounted in a steel frame under car to properly balance car. |
| | | |
| <u>3.6 Hoistway
Projections</u> | .1 | Provide bevelling of existing recesses in hoistway to code requirements. |
| | | |
| <u>3.7 Erection</u> | .1 | Thoroughly clean down hoistways and all equipment. |
| | | |
| <u>3.8 Protection</u> | .1 | Provide protective coverings for finished surfaces. |
| | | |
| <u>3.9 Cleaning</u> | .1 | Completely remove protective coverings from finished surfaces and components. |
| | .2 | Clean visible surfaces and components before project completion. |
| | .3 | Refurbish all retained metal faceplates. |
| | .1 | Consult Professional Metals Conservation Specialist before cleaning. |
| | .2 | DO NOT use wet cleaning methods including sprays, damp cloths, sponges etc. Surface dirt is turned into mud and ground into and left behind in the recesses and crevices of castings. |
| | .3 | DO NOT use polishes on any surface unless specifically directed. |
| | .4 | DO NOT use polishes which leave residues in corners and recesses. |
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- .5 DO NOT use polishes on any surface that has any kind of clear coat applied.
- .6 Do use soft brushes and a vacuum to remove dust and dirt from surfaces.
- .7 Do use soft dry cloths to wipe surfaces.
- .8 Clear coat surfaces should be cared for as an automotive finish. Harsh industrial cleaners are never to be used.
- .9 Untreated bronze/brass should have fingerprints removed using "Never-Dull" polish wadding.

3.10 Touch Up

- .1 Upon completion, touch-up and restore to new conditions all factory finished surfaces where damaged or defaced.
- .2 Replace damaged or defaced items if required.

3.11 Machine Room
Noise Level

- .1 Design and install the equipment so that the increase in noise level in the machine room with the elevator running does not exceed 30 dB, as measured by a sound meter located in the machine room.
- .2 Measure this noise level at center of room using a appropriately calibrated sound level meter on the "A" scale with a "S" response.

3.12 Performance
Requirements

- .1 Provide start to stop time required to travel at typical 4 m floor as:
 - 4.5 seconds for 500 fpm cars;
 - 5.8 seconds for 350 fpm cars.The above time shall be measured with full load in the car.
- .2 Set the car and hoistway doors to safely open and close in:
 - 1.7 and 2.4 seconds for 42" wide center opening;
 - 2.7 and 4.5 seconds for 48" wide two speed side opening.
- .3 Set the dwell times to 1.5 seconds for car, and 3 seconds for hall initially.
- .4 Adjust acceleration rate to between 1.0 and 1.1 m/s⁵.
- .5 Adjust jerk rate (change in rate of acceleration) not to exceed 2.5 m/s⁵.
- .6 Limit horizontal acceleration experienced in the cab to 25 m/s/s in both horizontal (x and y) axes.
- .7 Limit cab noise levels to 60 dB when moving and 68 dB during a door operation cycle, as measured by a sound meter located in the centre of the cab and set on the "A" scale with an "F" response.
- .8 Provide adjustable door detector interrupt and nudging time, initially set at 20 seconds.
- .9 Adjust elevators to provide smooth acceleration and provide a comfortable and agreeable ride to the passengers.
- .10 Maintain floor levelling accuracy of 9 mm or better.

- .11 Meet all above parameters while providing dependable, consistent elevator operation without undue wear or excessive maintenance over the life of the elevator installation.

3.13 Test Data

- .1 Within 48 hours of final inspection by Provincial authority, provide Departmental Representative with a copy of the inspection report.

3.14 Field Quality Control

- .1 Perform and meet tests required by CSA/CAN-B44.
- .2 Supply instruments and carry out full load and balance loads tests.
- .3 Furnish test and approval certificates issued by jurisdictional authorities.
- .4 Provide 2 weeks written notice of date and time of tests.
- .5 Maintain a copy of this specification on site during construction.
- .6 Attend at job site meetings pertaining to the Work.

3.15 Burning Torches

- .1 Do not employ burning torches in the course of the Work. Work with burnt out holes will be rejected.

3.16 Welding

- .1 Identify field welds with welder's identification stamp. Carry out welding after regular working hours in the building.

3.17 Departmental Representative .1

- The Departmental Representative is authorized to stop the Work whenever the stoppage is necessary to ensure the proper execution of the contract.
- .2 Furnish competent men and equipment for inspecting and directing speed, load and such other acceptance tests as the Departmental Representative may deem advisable.
 - .3 Provide a competent Mechanic or Adjuster to assist the Departmental Representative in carrying out one (1) final inspection and, if required, one (1) re-inspection. Allow for up to four (4) hours of assistance total.
 - .4 Notify the Departmental Representative
 - .1 One week prior to commencement of work.
 - .2 On completion of installation of each controller.
 - .3 On completion of installation of each new car door operator.
 - .4 On booking of each TSSA inspection.
 - .5 On completion of deficiencies.

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- 3.18 Demonstration .1 In the presence of the Facility Manger, Engineer and building staff, during silent hours of the building, use trained persons to demonstrate:
- .1 Emergency Recall and In Car Emergency Operation.
 - .2 Dispatching features, Independent Service Operation and the operation of any other devices necessary for the operation of the elevators, by the building staff.
- .2 Allow at least four (4) hours for demonstration.
- 3.19 Commissioning .1 Designate one staff person as Contractor=s commissioning manager for the project. Manager to be of Adjuster, Supervisor or Manager level or higher.
- .2 Attend at job site meetings pertaining to the Work.
- .3 After Provincial inspection of each elevator and before turn-over for customer use, test each elevator in simulated automatic operation without passenger access.
- .1 Test for three (3) consecutive hours with no load operating from floor to floor, with or without door operation.
 - .2 Test for three (3) consecutive hours with 100% load operating from floor to floor, with or without door operation.
 - .3 Test for three (3) consecutive hours operating from floor to floor with door operation. Provide barricades and signage to indicate that an elevator test is in progress.
- .4 Before turn-over for customer use, test elevators as following:
- .1 Running current in up direction with 42% car load.
 - .2 Running current in down direction with 42% car load.
 - .3 Governor overspeed setting.
 - .4 Safety trip setting.
 - .5 Door timings and dwell settings.
 - .6 Operating speed up and down.
 - .7 Door close force.
 - .8 Door detector interrupt setting.
- .6 During warranty maintenance period closely monitor equipment for malfunctions and track reliability. Achieve a reliability rate of less than 0.6 malfunctions per elevator per month.
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Table 1- Commissioning Data to Be Submitted by Contractor

PARAMETER	Elev. A	Elev. B	Elev. C	Elev. D	Elev. E
Car speed UP (fpm)					
Car speed DOWN (fpm)					
Running current full load UP (amps)					
Running current no load DOWN (amps)					
Running current balanced load UP (amps)					
Running current balanced load DOWN (amps)					
Car call dwell (sec)					
Hall call dwell (sec)					
Governor pull through (pounds)					
Governor overspeed switch, mechanical (fpm)					
Governor overspeed switch, electrical (fpm)					
Car slide on safeties, full load (inches)					
Door stall force (pounds)					
Door timeout (sec)					

END OF SECTION