

Elevator Upgrade Specification

**Granville Residence
1261 Granville St.
Vancouver, BC**

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1. General

1.1. Scope

This specification is intended to cover the upgrading of one (1) existing basement traction passenger elevator as described hereinafter, in a first class workman-like manner, by the Elevator Subcontractor.

1.2. Definitions

Terms used in the specification shall be defined as given in the latest adopted edition of the ASME A17.1-2007/CSA B44-07 - Safety code for elevators and escalators.

Where the term “Owner” or “Owner’s Representative” is used herein, this shall be read as “The City of Vancouver”.

Where the term “Elevator Consultant” is used herein, this shall be read as “VERTECH Elevator Services Inc.”.

Where the term “Contractor” or “Elevator Subcontractor” is used herein, this shall be read as the person(s) or company contracted by the General Contractor to furnish materials and labour as required by the specification and contract documents.

Where the term “General Contractor” is used herein, this shall be read as the company selected by the Owners to manage the overall construction of the project.

1.3. Related Work

To complete this installation, the following items must be performed or furnished by trades other than the Elevator Subcontractor, in accordance with governing codes: Any other work required to complete the installation or satisfy the regulatory authorities and not specifically listed herein shall be the responsibility of the Elevator Subcontractor. The following items shall be completed as part of The General Contractors Scope of Work:

Miscellaneous Building Work (See separate Architectural specifications and drawings):

- a) Patching and fire-stopping of any new or existing holes and penetrations in the elevator machine room and hoistway enclosure.
- b) Abatement of hazardous materials in the elevator machine room partitions and provision of new drywall finishes and fire separated machine room partition.
- c) Installation of a new fire-rated elevator machine room access door complete with new self-locking and self-closing door hardware.
- d) Removal of non-structural infill construction in the opening between the hoistway and machine room and new rated drywall finishes at the opening.
- e) Provide and install a type ABC fire extinguisher in the elevator machine room (wall mounted).

Electrical Work (See separate Electrical Design specifications and drawings):

- a) Provide additions and alterations to the building fire alarm system to provide suitable signals for initiating recall of the elevator in accordance with the B44-07 Elevator Safety Code. Provide smoke detectors at each elevator landing, in the machine room and top of shaft if not already in place and suitable interface signals and programming of the fire alarm system to recall the elevator as required. In particular provide a smoke detector in the elevator machine room and a smoke detector at the basement level elevator landing where detectors are not currently in place.
- b) Remove all electrical components, switches, fixtures, outlets, conduit, boxes, etc. in the elevator machine room to facilitate abatement and re-install electrical services on restoration of machine room partitions and finishes.
- c) Provide new GFCI power outlets in the elevator pit and machine room to replace any and all existing power outlets in the pit and machine room areas.
- d) Provide a new 3 phase power disconnect switch for the elevator power supply. Provide new feeder wires and conduit from the disconnect switch to the new elevator controller or transformer location as required. Size of new disconnect switch and fusing to suit the new elevator equipment requirements. New disconnect switch to include auxiliary contact for optional elevator battery levelling device that may be selected by the Owner. New disconnect switch to be located on lock jamb side of the elevator machine room access door with proper electrical code clearance.
- e) Provide a connection to a proper earth ground for the elevator electrical power supply. Provide a new separate ground/bonding conductor in the 3 phase elevator power supply with feeder wire to the elevator controller to suit the new equipment.
- f) Provide a new single phase power disconnect switch for the elevator cab lighting power supply. Provide new feeder wires and conduit from the disconnect switch to the new elevator controller location as required. Size of new disconnect switch and fusing to suit the new elevator equipment requirements. New disconnect switch to be located on lock jamb side of the elevator machine room access door with proper electrical code clearance.
- g) Provide new energy efficient LED strip light fixtures in the elevator machine room to replace the existing light fixtures and to provide 200 lx illumination in all areas measured at floor level. New fixtures shall be suitably mounted and located such that they do not encroach on the minimum required headroom in the elevator machine room (2135 mm clear headroom required)
- h) Provide new energy efficient LED strip light fixtures in the elevator pit to replace the existing light fixtures and to provide 100 lx illumination in all areas measured at pit floor level. Pit fixtures shall be guarded against breakage with a wire guard or polycarbonate lens.
- i) Provide telephone line connections to the new elevator controller location for the elevator telephone.
- j) Provide new EXIT signs in the building as required along egress paths at the designated and alternate elevator recall levels.

Mechanical Work (See separate Mechanical Design specifications and drawings):

- a) Provide a suitable machine room environment to maintain the machine room temperature between 10°C and 35°C.
- b) Provide and install a new quiet thermostatically controlled machine room HVAC system. Include fire rated vents/dampers as required to suit machine room fire separation requirements.
- c) Provide alterations to the elevator machine room sprinkler system to relocate sprinkler heads and piping to provide a minimum clear headroom of 2135 mm in all areas of the elevator machine room. Sprinkler heads in the elevator machine room shall have an intermediate temperature rating and they shall be provided with mechanical guards.

1.4. Alternative Products

Alternative products to those specified may be accepted provided they are pre-approved in writing by the Owner prior to submission of bid.

Elevator Subcontractors wishing to obtain pre-approval of alternative products shall make such requests in writing for consideration by the Owner and the Elevator Consultant. Requests for alternatives shall include a full description of each product including full-disclosure of the proprietary nature of the equipment including diagnostics, tools, components and spare parts. Requests shall also include a list of sites where the product has been used locally, references and details on the training available for the products including training for third party Elevator Subcontractors or the Owner's personnel.

Acceptance of alternative products shall not imply acceptance of any deviation or variances from the specified requirements unless such deviations or variances are clearly stated and agreed to in writing prior to the submission deadline.

1.5. Codes and Regulations

All new equipment shall be furnished and installed in accordance with the CSA/CAN-B44-07 Safety Code for Elevators, including any applicable supplements, the BC Safety Standards Act and the BC Elevating Devices Safety Regulation and any other local requirements that may be in force.

The new equipment and installation shall comply with the Canadian Electrical Code, the Vancouver Building ByLaw and Fire Code for the jurisdiction of the work as well as any and all applicable local codes.

1.6. Certificates

The Elevator Subcontractor shall furnish all licenses and permits and shall arrange for and make all inspections and tests required thereby. The cost of certificates, licenses, permits, etc. for any sub-contract work shall also be included in the basic submission price.

1.7. Material and Workmanship

Provide only new material and equipment designed for elevator use.

Install all equipment in a neat and professional manner. Label all components clearly and secure all wiring in a neat and orderly fashion.

1.8. Warranty

The Elevator Subcontractor shall guarantee the materials and workmanship of the apparatus furnished under these specifications and will make good any defects not due to ordinary wear and tear or improper use or carelessness which may develop within two (2) years from date of substantial completion of the project. Substantial completion shall be the point at which all of the new equipment has been installed and all of the elevators are operating as a group with all required features operational. The Elevator Consultant shall verify the date of substantial completion of the work.

1.9. Hoarding

Provide hoarding for the protection of the public and worker's at the site.

Where the work requires that the hoistway is open provide a substantial hoarding with a locked access door to protect the opening.

Provide barriers at all working floors to protect the public from the area of the work.

1.10. Conduct

The building is occupied and therefore conduct at the site must be appropriate so as not to interfere with the normal functioning of the building.

Materials, tools and other equipment shall be stored and protected in areas designated by the Owner, if available.

Any noisy or smelly work or work requiring that more than one elevator is required to be out of service for any amount of time shall be performed at times suitable to the Owner. Access and use of the elevators will be permitted for moving in new equipment and materials and for removal of equipment. This work shall include items such as hammer drilling, grinding, hoisting equipment in & out of the machine room, work to switch over hall buttons or to test emergency recall and standby power features. Arrange to do such work at times designated by the Owner. The Elevator Subcontractor shall include an allowance in the contract price to conduct such work in overtime as may be required.

The Elevator Subcontractor and the General Contractor shall be responsible for any damage or soiling of building finishes resulting from performance of the work and the Owner shall reserve the right to deduct the cost of any remedial work required in the event that the Elevator Subcontractor or General Contractor fails to correct any such damage or soiling.

Any prolonged, disruptive or noisy work that is required to be conducted as rigging, hoisting, etc. shall be done outside of regular working hours. The Elevator Subcontractor shall make an allowance for significant overtime to perform disruptive work of this nature outside of regular working hours when necessary.

Permitted hours of work at the site will generally be from 7:00 AM to 5:00 PM to be verified with the tenants once the schedule is confirmed. Prior notice and approval must be given and obtained prior to any work being performed outside of the approved hours.

1.11. Site Access

The Elevator Subcontractor shall examine the site with respect to the constraints and limitations of accessing the areas of the work.

Elevator Subcontractors shall allow for the existing site conditions in preparing estimates for moving in and installing new equipment, tools and materials as well as equipment removal.

The Elevator Subcontractor and the General Contractor shall protect the building floor levels, stairwells, etc. when using common areas for hoisting, storage and the like. The Elevator Subcontractor and the General Contractor shall be responsible for any damage or soiling of building finishes resulting from

performance of the work and the Owner shall reserve the right to deduct the cost of any remedial work required in the event that the Elevator Subcontractor or General Contractor fails to correct any such damage or soiling.

1.12. Storage

Storage for the Elevator Subcontractors tools, equipment and for the new elevator equipment may be limited on site and the Elevator Subcontractor shall ascertain and allow for existing site conditions in this regard.

1.13. Personnel

Personnel assigned to the site shall wear suitable, clean uniforms and attire and shall act in a courteous and professional manner while conducting their work on the premises. The personnel shall observe and obey the policies and procedures for the place of work regarding; security, safety, access and routine sign-in requirements and shall obtain and wear identification, if required by and approved by the Owner, at all times when working at the site.

The Elevator Subcontractor shall also adhere to the General Contractors requirements.

1.14. Site Safety and Hazardous Materials

The site personnel shall be provided with appropriate personal and workplace safety equipment and shall adhere to recognized safe working procedures.

The Elevator Subcontractor shall adhere to the Worksafe BC Occupational Health and Safety Regulation regarding workplace safety requirements and guidelines for work in confined spaces, fall protection and working with hazardous materials as well as any other applicable conditions or requirements.

The Elevator Subcontractor shall review the Hazardous Materials assessment report for the site and conduct their work accordingly observing proper methods for dealing with any identified materials that maybe disturbed during the performance of the work. The elevator components themselves may contain hazardous materials and the Elevator Subcontractor should undertake any required testing if disturbing any components or material that may contain hazardous materials. Removed elevator components that may contain hazardous materials shall be handled and disposed of observing proper techniques and this shall include electrical wiring, brake pads, insulated components or switches, arc deflectors, painted components, etc. The Elevator Subcontractor shall handle and dispose of these materials that are removed from the site in an appropriate manner as part of the scope of this work.

1.15. Trademarks, Patents, Copyrights

The equipment provided shall not display any trademarks or other visible company logos.

1.16. Date Compliance

Provide equipment and control systems fully compliant for rollover and operation through the year 2020 and beyond. Provide a letter of assurance certifying that the equipment provided is fully date compliant with respect to time and date storage and time and date information exchange.

1.17. Inspection and Commissioning

Upon completion of the work and prior to turning elevators over for use by the public arrange for acceptance tests and inspections with the regulatory authority. Advise the General Contractor at least 48 hours in advance of the testing and inspection so that they can notify the Owner and the Owners consultants so that a representative may be on site. The Elevator Subcontractor shall submit copies of any such inspection reports to the General Contractor and the Elevator Consultant within 48 hours of receipt. Include for any repeat inspections that may be required to satisfy the requirements of the inspecting authority.

Inspection and testing shall also be conducted by the Elevator Consultant. Provide qualified manpower, tools, test weights and instruments to complete these tests and any repeat tests that may be required as a result of incomplete or deficient work. Allow for a minimum of one half (1/2) man day per elevator for testing and inspection and additional time for repeat inspections if required.

The Elevator Sub-Contractor shall also provide demonstrations to the Owner and site personnel on the operation of the elevator, reset procedures, emergency operations, etc.

1.18. Description of Existing Equipment

Elevator/Description	Passenger Elevators
BCSA Elevator ID #'s	4783
Manufacturer/Installer	Montgomery Elevator
Type of Elevator	Geared Basement Traction
Capacity	1500 lb.
Rated Speed	100 fpm
Number of Stops	6 Stops (front only)
Floors Served	B, ★G, 2, 3, 4, 5
Controller Type	Montgomery Relay Logic – 2 Speed AC
Operation	Simplex: Full Selective Collective
Hoist Machine	Montgomery 207E Geared Traction Machine
Auxiliary Brake	None
Door Type	Centre Opening
Door Size	2'-8" wide
Door Operator	GAL
Door Reopening Device	Formula Systems – Safescreen
Car Operating Panel	One (1) per car, Applied Faceplate
Car Position Indicator	One (1) per car – in COP
In-Car Riding Lanterns	None
Hall Buttons	One (1) Riser of Surface Mounted Fixtures at Accessible Height
Hall Direction Lanterns	None
Hall Position Indicator	None
Firefighters Elevator:	NO
Standby Power:	NO

1.19. Cutting and Patching

Any cutting, patching, painting or other restorative work required to accommodate the installation of the new equipment and operating and signal fixtures, and not specifically listed herein as being by others, shall be the responsibility of the Elevator Subcontractor.

Prior to proceeding with any such work the Elevator Subcontractor shall review the details of the work with the General Contractor and obtain approval to proceed.

All effected finishes shall be suitably restored to the Owner's satisfaction.

The General Contractor may agree to perform any necessary cutting and patching for the Elevator Subcontractor provided the Elevator Subcontractor informs the General Contractor of the required scope of work so that the General Contractor can include for the necessary work in their overall scope of project. The Owners shall not be responsible for the cost of any additional work should the General Contractor and the Elevator Subcontractor fail to coordinate any such items required to perform the work.

Furthermore the Elevator Consultant shall not be responsible for any work that is not properly coordinated between the Elevator Subcontractor and the General Contractor.

Note that environmental testing may be required by the City of Vancouver prior to any concrete cutting of walls, floors or ceilings.

1.20. Remote Conduit and Wiring

Any remote conduit and wiring required to interconnect the elevator control system with lobby panel, panel for emergency personnel, monitoring and control equipment or any other equipment provided under this specifications, and not specifically listed herein as being by others, shall be the responsibility of the Elevator Subcontractor.

Any wires brought "to the hoistway" by other trades shall be routed to the elevator machine room in the hoistway by the Elevator Subcontractor.

Prior to proceeding with any such work the Elevator Subcontractor shall review the details of the work with the General Contractor and obtain approval to proceed.

The General Contractor may agree to perform any necessary remote conduit and wiring for the Elevator Subcontractor provided the Elevator Subcontractor informs the General Contractor of the required scope of work so that the General Contractor can include for the necessary work in their overall scope for the project. The Owners shall not be responsible for the cost of any additional work should the General Contractor and the Elevator Subcontractor fail to coordinate any such items required to perform the work.

Furthermore the Elevator Consultant shall not be responsible for any work that is not properly coordinated between the Elevator Subcontractor and the General Contractor.

2. Product – Elevators

2.1. Retained Equipment

The following equipment may be retained provided the requirements of the specification and governing codes and regulations can be met with respect to performance, operation, reliability, safety and other miscellaneous requirements:

Refurbish all retained equipment. Clean, lubricate, paint and adjust all components to appear and operate as new, replace any parts or components that are worn or otherwise damaged. Make allowance for existing wear and other conditions and restore retained equipment to provide smooth, quiet, comfortable and reliable operation of the equipment. Replace or repair any parts that are worn. This shall include but not be limited to sheaves, ropes, motors, brake linings, gears, bearings, seals, switches, etc.

Equipment that may be Retained

- a) Overhead Deflector Sheaves
- b) Car Sling, Platform, Cab Structure, Sill and Car Door Panels.
- c) Hoistway Entrances, Door Panels, Sills, Hoistway Door Tracks, Safety Retainers and Hangers
- d) Door Operator, Linkage, Clutch and Car Door Restrictor
- e) Hall Door Interlocks
- f) Infrared Door Detector
- g) Counterweight
- h) Rails
- i) Pit Ladder

2.2. New Equipment

The following equipment shall be replaced with new equipment as detailed elsewhere in the specifications:

New Equipment to be Provided

- a) Individual Elevator Controller with Restricted Access Security System Interface and Emergency Operational Features.
- b) Variable Speed Drive and Motion Control Equipment.
- c) Velocity and Position Feedback Devices.
- d) Geared Basement Traction Machine with Integrated Deflector Sheave Assembly, Machine Safety Guards and AC Hoist Motor.
- e) Hoistway Overhead Deflector Sheave Refurbishment.
- f) New Hoist Ropes and Hoist Rope Fasteners.
- g) Auxiliary braking device.
- h) Car Overspeed Safety Device.
- i) Overspeed Governor, Governor Idler & Governor Rope.
- j) Car and Counterweight Pit Buffers.
- k) Machine Room, Hoistway and Cab Wiring, including Travelling Cables.
- l) All New Car and Landing Door Rollers.

- m) Top of Car Inspection Controls, Emergency Cab Light & Bell.
- n) Hoistway Door Unlocking Devices at all floors.
- o) Car and Hall Operating and Signal Fixtures, including Car Operating Panel, In-Car Direction Lantern, Voice Announcer (Optional), Car Position Indicator and Handsfree Telephone Device.
- p) Hall Call Button Fixtures with Position Indicators and Emergency feature hall fixture at Designated Recall Level.
- q) Hall Tactile and Braille Markings
- r) Miscellaneous Signage.
- s) Car and Counterweight Roller Guides
- t) Car Top Guard Rail and Extended Cab Apron Guard.
- u) Cab Ventilation Fan
- v) Miscellaneous Components, Pit Stop Switches, Hoistway Access Devices, etc.
- w) New Cab Interior Finishes including Flooring.
- x) Seismic Safety Features.
- y) Optional – Cab Voice Announcer
- z) Optional – Regenerative Drive System.
- aa) Optional – Automatic Battery Powered Levelling Device.
- bb) Optional – Schedule for Minimum Disruption

Remove all replaced equipment from the site and take possession of such equipment. The Owner reserves the right to retain ownership of any equipment removed and shall advise the Elevator Subcontractor of their intent to retain any such components prior to their removal. Removed materials shall be disposed of in an ecological and environmentally friendly manner and materials should be reused, recycled to avoid unnecessary waste. Metals in particular should be diverted to a certified metal recycling facility and waybills shall be provided for all metals (including the weight) that is diverted to a recycling facility.

Dispose of any replaced equipment in a suitable manner.

2.3. Architectural Finishes

The new equipment provided shall have the following finishes:

Fixture or Component	Material or Finish
Car and Hall Operating & Signal Fixtures	Stainless Steel #4 Brushed Finish
Lobby Phone and Lobby Panel	Stainless Steel #4 Brushed Finish
Cab Interior Components:	
Cab Front Return, Car Door Header, Car Door Jambs and Car Door Panels	New Rigidized Stainless Steel #4 Brushed Finish cladding. Rigidized Metals Pattern 5WL, Rimex “Squares” or other pattern as selected by the Owner
Cab Rear & Side Walls as applicable	New, Vertical, Raised, Removable Panels finished with Plastic Laminate as selected by the Owner. Stainless Steel Brushed Finish panel reveals and kickplate/base.
Cab Ceiling	New Plastic Laminate or Brushed Finish Stainless Steel Applied Finishes as selected by the Owner

Cab Suspended Ceiling	NONE – Cab Lighting to be recessed directly into the Cab Ceiling
Cab Lighting	New energy efficient LED recessed lights as approved by the Owner
Cab Handrails	Low Profile, Flat Bar Stainless Steel Handrail 100 mm high with ends returned to the wall finishes (on all non-access walls)
Cab Flooring	New Sheet Vinyl Flooring consisting of 2.5 mm thick solid colour Forbo Walton linoleum or Johnsonite Tarkett Lenza, or equivalent. Final selection to be approved by the Owner

2.4. Car Operating Panel

A new applied car operating panel shall be supplied. Provide one panel per elevator to replace the existing car operating panel. Where possible the new car operating panel shall be mounted in the cab side wall panel.

The panel shall contain a bank of illuminating car call buttons marked to correspond to the landings served, an emergency call button, door open and door close buttons. The emergency call button shall be connected to a bell that serves as an emergency signal.

The car shall be provided with the following switches located in a lockable cabinet:

- a) light toggle switch,
- b) fan toggle switch,
- c) inspection/hoistway access enable keyed switch,
- d) emergency light test switch or button,
- e) 110 V duplex power outlet,
- f) 2 blank cutouts for future keyed switches or other components,

The car shall be provided with the following components flush mounted in the panel faceplate:

- a) Emergency Recall Illuminating Indicator,
- b) Independent Service keyed switch
- c) Stop/Run Keyed Switch,
- d) Integral Emergency Cab Lighting Lens,
- e) Hands Free Emergency Voice Communication Device,
- f) Emergency Telephone Activation Button,
- g) Restricted Access Keyed Switch for “B” Level,
- h) Flush mounted lens and mounting studs for future card reader,

The car shall be provided with the following switches and/or devices located in a lockable “Firefighter’s Operation cabinet”:

- a) In-Car Firefighter’s Operation Switch and written instructions,
- b) Call Cancel Button,
- c) Fire Recall Illuminating Indicator,
- d) Emergency Stop Switch or Button,
- e) Additional Door Open and Close Buttons for Front and Rear Doors, as applicable,

All operating devices and components for the public shall be provided with tactile markings mounted flush in the panel faceplate and secured firmly in place with studs and flanges.

All illuminating devices shall be provided with long life LED illumination which is clearly visible in the ambient lighting level of the cab.

The panel faceplate shall be professionally engraved to identify each component, the position of switches, the elevator capacity, the Owner’s identification number as well as any jurisdictional identification numbers applicable to the installation.

Shop drawings shall be submitted with details for review and approval prior to manufacturing.

Provide the car call buttons in a single vertical column.

The restricted access keyed switch shall be a momentary contact spring return type switch labelled as “Restricted Access” and it shall be located adjacent to the basement landing car call button. The switch positions shall be labelled as OFF and ON and the key shall be removable in the OFF position only. When the key is held in the ON position the user may register a car call for the basement floor landing using the car call button. Otherwise the basement floor landing car call button shall be disabled other than when switched to Phase 2 Firefighters Emergency Operation. Keying shall be unique and confirmed at the time of shop drawing review.

The following manufacturers and button fixture products are approved for use on this project:

- Dupar Controls – US100 Target Style Vandal Proof

2.5. Keying

Elevator Subcontractors shall provide a common key for each group of devices per the following:

Key Grouping	Restrictions	Function
1	None	Service Cabinet, Independent Service
2	Restricted – Elevator Maintenance & Inspection Personnel Only	Inspection, Hoistway Access & Enabling, Run/Stop
3	Emergency Personnel	Fire Recall, Voice Communication Failure Reset, Lobby
4	Security – Restricted Access	“B” Floor Restricted Access Switch

2.6. Car Position Indicators

Provide a new car position indicator display in the car operating panel at a minimum height of 6’-6” from the cab finished floor level. The position of the car in the hoistway shall be shown by the illumination of the indication corresponding to the range of landing at which the car is stopped or passing.

The position of the car in the hoistway shall be shown by the illumination of the indication corresponding to the range of landing at which the car is stopped or passing.

Display shall consist of LED 16 segment displays with characters no less than 2" in height.

Display shall be sufficiently illuminated such that they are clearly visible in the ambient lighting level of the cab.

2.7. Hall Push-button Fixtures and Position Indicators

Provide new hall button fixtures at all floors to replace the existing fixtures. The fixtures shall be surface mounted fixtures at all floors where required to mount the new hall buttons at an accessible height. Surface mount fixtures shall have rounded or chamfered edges and should not protrude more than 1" from the finished wall surface.

At each terminal landing, a fixture containing a single button shall be provided and at each intermediate landing, a fixture containing "UP" and "DOWN" buttons shall be provided.

When a call is registered by pressing a hall button, that button shall become illuminated and shall remain illuminated until the call is answered.

Provide LED illuminating elements with a minimum usage rating of 100,000 hours. The illumination shall be of sufficient intensity that it is clearly visible in the ambient lighting levels of corridors.

Each hall station including the Ground floor fixture shall include a new hall position indicator display. Display shall consist of LED 16 segment displays with characters' no less than ½" in height. Display shall be sufficiently illuminated such that it is clearly visible in the ambient lighting level of the elevator lobby area.

All cutting and patching necessary for the installation of the fixtures shall be the responsibility of the Elevator Subcontractor or the Elevator Subcontractor shall coordinate this work for the General Contractor to complete at no additional cost to the Owners.

The following manufacturers and button fixture products are approved for use on this project:

- Dupar Controls – US100 Target Style Vandal Proof

2.8. In-Car Direction Lantern

Provide one (1) new in-car direction lantern for the elevator mounted in the car entrance door jamb. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel.

A chime shall also be furnished on the car which will sound once for "UP" and twice for "DOWN" as the doors are opening or alternatively a voice announcer shall be provided to announce the direction of travel.

The illuminating elements shall be LED lamps with a minimum usage rating of 100,000 hours. The illumination shall be of sufficient intensity that it is clearly visible in the ambient lighting levels of the cab and corridors.

The audible chimes or audible voice messages shall be electronic with easily adjustable volume controls. The sound produced shall be pleasing yet distinctive.

2.9. Designated Level Emergency Feature Hall Fixture

Incorporate the following into the new hall fixture at the Ground floor level for the elevator. The fixture shall contain the following:

- a) A three (3) position firefighters recall keyed switch for the elevator.
- b) An indicator light to indicate the recall operation has been activated for the elevator.
- c) Written Instructions as required by the governing regulations for the operation of the recall switch.
- d) Elevator voice communication system failure indicator light, audible signal and a means to silence the communication failure audible signal.

The panel shall be engraved as required by the governing regulations.

The fixture shall be a surface mounted fixture. Surface mount fixtures shall have rounded or chamfered edges and should not protrude more than 1" from the finished wall surface.

All cutting and patching necessary for the installation of the fixtures shall be the responsibility of the Elevator Subcontractor or the Elevator Subcontractor shall coordinate this work for the General Contractor to complete at no additional cost to the Owners.

2.10. Hoistway Access Devices

Provide new hoistway access keyed switch fixtures at the bottom and top landings for access to the elevator car top and pit regardless of the rated speed of the elevator. Keying shall be the same as the inspection/hoistway access enable keyed switch located in the car operating panel.

The new fixtures shall be installed in the landing door jamb, or in the landing door sight guard for each respective elevator. Do not mount the devices in the hall button fixture.

The Elevator Subcontractor shall be responsible for any cutting and patching necessary to provide suitable cutouts for the new fixtures, to restore the elevator entrance finishes and infill construction to proper conditions on completion.

2.11. Voice Announcer - Optional

Indicate in the submission the separate optional extra cost to provide a cab voice announcer as follows:

Provide equipment to allow an audible announcement in each elevator cab as follows and as required by the governing regulations. The messages shall be appropriate to reflect the conditions pertinent to the elevator and shall be subject to the Owners approval.

Connect the equipment to the elevator control system and determine the necessary inputs so that the messages reflect the conditions pertaining to the respective elevator or group function. The equipment shall be mounted in the machine room or in the car operating panel, do not mount equipment on the car top with exception of the remote speaker which may be mounted on the car top if necessary.

Mount the remote speaker in the car operating panel or car top behind a protective grille. Ensure that the location of the speaker will allow the announcements to be clearly audible in the car. The system shall be equipped with site adjustable volume control.

As a minimum the system shall include, but is not restricted to the following announcements:

- a) Announcement of the floor designation that the elevator is stopped at or about to stop at.
- b) Announcement of the direction of travel of the elevator. The announcement shall be made when opening the doors in response to car or hall calls.
- c) Announcement warning passengers to stay clear of the doors when closing with the door re-opening device bypassed.
- d) Announcement instructing passengers to exit the elevator when doors open when being recalled to the designated recall floor as a result of emergency recall operation or other similar feature.

All announcements shall be available in English or French or in both languages and in a male or female gender voice as selected by the Owner and/or Elevator Consultant.

The equipment shall be provided with non-volatile memory and digital storage media. The system shall have adequate capacity to store up to 40 different announcements and a total of 4 minutes of recording, as a minimum.

Provide approval forms for the voice announcements, gender and language and other details for review and approval prior to manufacturing.

2.12. Cab Interior Finishes

Provide new cab interior finishes as follows:

Portions of this work may be subcontracted and the names of all proposed subcontractors shall be provided in the proposal. The Owner shall approve the use of any subcontractor prior to award of any subcontract work. Subcontractors shall provide references where similar work has been performed within the last 24 months.

Completely remove the old finishes including wall panels, reveals, cab ceiling finishes, cab lighting fixtures, etc. Strip the cab walls and car door panels of old laminate and stainless steel cladding finishes as applicable and prepare for new finishes. Remove the existing cab flooring as well as any sub floor or old flooring that may still be in place and prepare for new flooring.

The car door, door posts, car door header and front return panels shall all be clad in new rigidized stainless steel finishes with overlapping or tight fitting joints. Cladding on the car door shall fully wrap the leading edge of the door panel and all fasteners shall be concealed.

Provide removable wall panels on the rear and side walls of plastic laminate as described elsewhere herein. Panels to be 5/8" thick composition board core with laminated back. Provide stainless steel reveal strips around each panel and in the cab corners and a stainless steel base/kickplate.

Provide a Hewco snap frame cab notice board on the side wall opposite the car operating panel from George H. Hewitt Co. suitable for one 8.5 x 11" sheet of paper in each cab.

Provide new plastic laminate or stainless steel finishes directly to the cab ceiling and car top escape hatch with tight joints at the removable section for car top escape hatch. Provide a minimum of four (4) new LED

pot lights recessed directly into the cab ceiling or more lighting to provide a suitable lighting level in the cab.

Provide new stainless steel handrails on the cab side and rear walls as specified elsewhere herein.

Provide new satin finish stainless steel protective pad hooks on all walls including front return panel and provide one complete set of new fire retardant protective pads of quilted canvas for the cab walls and front return panels. Include cutouts for the car operating panel(s) as necessary.

The materials provided shall comply with the latest revision of the governing code with respect to flame spread and smoke development classification and other requirements for elevator cab interior finishes.

The counterweight shall be adjusted by adding or removing weight such that the total weight of the counterweight is equal to the weight of the car plus approximately 40 to 50% of the rated capacity to suit the original equipment design or new requirements. Weight addition to the cab shall be limited to a maximum of 5% of the combined original sum of the weight of the cab, enclosure and its capacity. Should the weight addition exceed this 5% then the weight addition shall be reviewed and approved by a registered professional engineer in accordance with clause 8.7.2.15.2 of the B44-07 Elevator Safety Code regarding an increase in the deadweight of the car.

The responsibility for the overall installation lies with the Elevator Subcontractor and the Owner does not intend to deal directly with the subcontractors.

2.13. Cab Flooring

Provide new cab flooring consisting of new heavy duty sheet vinyl flooring as selected by the Owner and as specified elsewhere herein. Include removal and disposal of old flooring and preparation for new flooring including new subfloor as required.

Any new materials provided shall comply with the latest revision of the governing code with respect to flame spread and smoke development classification and other requirements for elevator cab interior finishes.

The responsibility for the overall installation lies with the Elevator Subcontractor and the Owner does not intend to deal directly with the subcontractors.

2.14. Car and Counterweight Guides

Provide new spring applied roller guides on the car and counterweight to replace the existing guides.

Roller guides shall remain in uniform contact with the guide rails. As a minimum provide Elscos Model B for the car and Elscos Model D for the counterweight or GAL roller guide assemblies model 378 for the car and model 377 for the counterweight.

2.15. Cab Lighting

Provide new cab lighting as specified elsewhere herein.

Provide a circuit which shall automatically shut off the cab lighting after the elevator has been idle for a predetermined time period (adjustable). Ensure that this feature is disabled when the elevator is out of service due to malfunction.

2.16. Cab Ventilation

Provide ventilation openings in the cab that are concealed by the finishes and protected as required by the elevator safety code.

Provide a new quiet cab ventilation fan mounted on the car top. Fans shall be of a rugged, quiet design with a maximum noise level of 55 Dba.

The fan shall be mounted to the elevator car top and the existing fan opening may be retained.

Provide an exposed stainless steel or white fan grille on the cab ceiling as selected by the Owner. Provide a Nylube #1600 fan grille or approved equivalent.

Provide a circuit which shall automatically shut off the cab ventilation fan after the elevator has been idle for a predetermined time period (adjustable). Ensure that this feature is disabled when the elevator is out of service due to malfunction. Fan to start automatically when activated by car or hall call.

2.17. Requirements for Passengers with Disabilities

Provide equipment in compliance with the latest revision of the Local Building Code and Appendix E of the CSA B44-07 - Safety code for elevators and escalators.

Raised markings shall be furnished adjacent to the car buttons, controls and voice communication device.

Hall Buttons shall be installed at the prescribed height.

Visual signals shall be provided to acknowledge registration of a car or hall call. Audible signals shall be provided to acknowledge registration of a car call.

Visual and audible signals shall be provided to indicate the car position and direction of travel.

Raised markings shall be furnished on each hall door entrance jamb at the prescribed height.

Cab handrails shall be installed at the prescribed height.

2.18. Hall Tactile Markings

Provide new tactile and Braille markings on each hall door frame at the correct, prescribed height.

Provide quality embossed metal jamb plate markings.

Provide EJ4 markings with a satin stainless steel finish character on a black background available from Stencil Cutting and Supply (SCS/AIM) Company, Ph. 1-800-783-4633 www.scs-aim.com or pre-approved equivalent product.

2.19. Emergency Voice Communication Device

A hands free emergency voice communication system shall be furnished in each cab mounted as an integral part of the car operating panel. Necessary wires shall be included in the car travelling cable and shall consist of a minimum of one shielded pair of 20AWG conductors.

Provide any necessary power supply required by the telephone equipment. The phone equipment shall have a built in back up power supply in the event of the loss of normal AC Power.

The telephone shall be equipped with an auto-dialer and illuminating indicator which shall illuminate when a call has been placed and flash when the call has been answered.

A separate activation button shall be provided on the car operating panel faceplate to activate the emergency voice communication device and initiate a call. The device shall be capable of transmitting a pre-recorded location message with an adjustable call time that can be extended by the monitoring station. The device shall be able to dial a primary emergency number, and be able to automatically dial a backup number in the event there is no answer at the primary number.

Provide a telephone system for communications off site or to a 24 hour monitored location via any of the following: auto dialer, arrange for off-hook type operation through the site PBX system, or arrange the phone to work with existing ringdown equipment.

The phone shall be able to receive incoming calls from other locations and shall be capable of acknowledging incoming calls and establishing hands free two way communication automatically.

The voice communication system shall include means to automatically verify the communication system operability either continuously or on a periodic (minimum daily) basis. If the verification means indicates that the voice communication system is not functional then a signal shall activate the visual and audible signal at the main floor elevator emergency fixture. A means to silence the audible signal shall be provided and it shall be accessible to authorized personnel only.

Provide a Webb Electronics VOIP compatible elevator telephone system or equivalent product.

The existing analog telephone line currently in use for the elevator shall be reused.

The Owner shall provide 24 hour monitoring of phone calls made from the elevator telephone. The Elevator Subcontractor shall arrange to monitor outgoing phone calls and respond to calls received at no extra charge as part of the elevator maintenance agreement if requested to do so by the Owner. Unless otherwise instructed by the Owner the telephones shall be set up to dial the City of Vancouver's elevator security / monitoring station at 604-708-2194.

2.20. Hoistway Operating Devices

Normal terminal stopping devices shall be provided to slow down and stop the car automatically at the terminal landings and to automatically cut off the power and apply the brake, should the car travel beyond the terminal landings.

Provide all new limit switches at the bottom of the hoistway to replace the existing limit switches.

2.21. Buffers

Provide new pit buffers for the car to replace the existing buffers as a means for stopping the car at the bottom limits of travel.

2.22. Car Freefall and Overspeed Safety Device

Provide a new car safety device to replace the existing safety device as follows:

Provide new car safety device to replace the existing safeties. The car safety shall be mounted on the bottom members of the carframe and shall be of the type A instantaneous style designed to stop the car should it attain excessive descending speed.

The safeties shall exert equal forces on both sides of each guide rail and the devices shall be readily adjustable.

Provide a new safety operated switch and linkages for activation of the car safeties and safety operated switch.

2.23. Car Top Guard Rail

Provide a substantial metal guard rail on the sides of the car top where the distance measured horizontally from the edge of the car top to the hoistway wall exceeds 300 mm.

The guard rails must be designed and installed to comply with the requirements of B44-07 Section 2.10.2.

2.24. Apron Guards

Provide new apron guard for the elevator to protect the space below the elevator cab.

Where space permits provide guards which extend no less than 4'-0" below the level of the car sill or to the maximum depth as pit depth allows.

2.25. Car Door Restrictor

The existing car door restrictor may be retained and reused provided it is refurbished and that the requirements of the specifications and governing codes and regulation can be met. Provide any modifications or alterations necessary to make the existing equipment work with the new equipment provided

The Elevator Subcontractor shall warrant the retained and refurbished equipment as new and shall not exclude any such retained or refurbished equipment from coverage under the on-going maintenance agreement for the equipment.

2.26. Door Operator and Car Door Equipment

The existing car door operator, car door clutch/vane and landing door interlocks may be retained and reused provided they are refurbished and that the requirements of the specifications and governing codes and regulation can be met. Provide any modifications or alterations necessary to make the existing equipment work with the new equipment provided.

The Elevator Subcontractor shall warrant the retained and refurbished equipment as new and shall not exclude any such retained or refurbished equipment from coverage under the on-going maintenance agreement for the equipment.

Refurbish the car door hangers, tracks and gibs and other related components replacing any parts that are worn or damaged.

Provide new car door rollers.

Adjust the door operation for smooth quiet operation at the times indicated elsewhere in the specifications and acceptable to the Owner and the Elevator Consultant.

2.27. Door Re-opening Device

The existing infrared door detector may be retained and reused provided it meets the requirements of the specifications and the governing codes and regulations. Provide any modifications or alterations necessary to make the existing device work with the new equipment provided. Alternatively provide a new infrared based light-ray type car door protective devices having a multi-beam array with the following operation:

When in their full open position, the doors shall be unable to initiate closing if one or more of the beams are interrupted by a person or object. If one or more of the beams are interrupted while the doors are closing, the doors shall stop, then reverse to reopen. The doors shall reclose after a brief time.

After a stop is made, the doors shall remain open for a time to permit passenger transfer, after which they shall close automatically. This time interval shall be less for a car call than for a hall call or a coincident car/hall call.

2.28. Hall Door Equipment – New and Refurbished

The existing hall door interlocks may be retained provided they are refurbished. Provide any modifications or alterations necessary to make the existing interlocks and pick up assemblies work with the new equipment provided. Provide new fire rated wiring at each landing to the interlocks.

Refurbish the hall door equipment including hangers, tracks, gibs, closers, relating devices and other related components replacing any parts that are worn or damaged.

The existing landing door safety retainers may be retained and reused.

Replace any worn, missing or damaged landing door gibs.

Replace any broken or damaged sight guards on the landing door panels.

Replace all car and landing door rollers with new rollers.

Provide new standard drop key type hoistway door unlocking devices at all landings for the elevator if not already in place.

2.29. Wiring

Provide complete new machine room, hoistway and cab wiring in accordance with the Canadian Electrical Code. Existing remote wiring to the elevator lobby panel may be retained and reused.

All wiring connections shall be made on terminal blocks which are clearly and permanently labeled.

2.30. Pit Stop Switches

Provide new pit stop switches in each elevator pit to replace the existing switches.

Switches shall be guarded against accidental operation and shall be located such that they are easily accessible from the pit floor level and also from the pit access level. Where the depth of the pit or point of access is such that one switch would not be accessible from both locations then provide one or more auxiliary switches in each location.

2.31. Pit Ladder

The existing pit ladder may be retained and reused provided it meets the requirements of the specifications and the governing codes and regulations.

2.32. Travelling Cables

Provide new travelling cables with cables designed specifically for elevator use.

Suspend travelling cables under the cab and in the hoistway using the steel core, wire mesh grips or as otherwise recommended by the manufacturer.

Travelling cables shall be installed to prevent twisting and kinking of the cables and the supports shall be horizontally spaced to match the inherent loop diameter of the cable.

Travelling cables should be supported so as not to come into contact with any equipment or the walls of the hoistway. Where contact is unavoidable provide protective pads of quilted canvas or other suitable material to prevent damage to the travelling cables.

Provide spare wiring consisting of the greater of a minimum of 10% or ten (10) individual conductors and provide a minimum of eight (8) twisted shielded pairs of 20 AWG communication conductors for voice communication, audio, video, security or other equipment which may be provided, over and above any pairs required by the elevator control system.

Shielded pairs for use by the current or future elevator security card reader equipment shall be run directly to the elevator security equipment demarcation point in the elevator machine room and shall be of adequate length to do so without splicing.

Travelling cable conductors shall be grouped and provided in separate travelling cables based on the use and signal voltage of the respective conductors. High voltage signals shall be separated from low voltage signals and cables used for serial communication and other noise or interference sensitive purposes.

Travelling cables should form a continuous run from each cab to the control equipment in the machine room. Do not terminate travelling cables or splice conductors at a junction box or any other point in the hoistway.

2.33. Emergency Light and Alarm Bell

A new emergency power unit employing a 12 volt, sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car and provide current to the alarm bell in the event of power failure.

Provide a translucent lens mounted integrally in the elevator car operating control panel as the illumination source.

Provide a new emergency alarm bell or signal located on the elevator car top.

2.34. Top of Car Inspection Fixture

Provide a new inspection fixture on top of the car containing continuous pressure "UP" and "DOWN" buttons, an emergency stop button, and an inspection switch. The inspection switch shall make the fixture operable and, at the same time, render the door operator and car and hall buttons inoperative. The operating station shall be located such that it is visible and easily accessible when accessing the car top from a front opening. The actuating switch shall be protected against accidental operation.

Provide a permanent top of car light fixture with a readily available switch and guard.

2.35. Machine Room Floor

The machine room floor shall be painted using a durable low V.O.C water based paint upon completion of the work.

2.36. Rated Speed and Capacity

The rated speed and capacity of the elevator shall remain unchanged.

2.37. Overhead Deflector Sheaves

The overhead deflector sheaves shall be retained and reused. Perform any repairs or replacements to provide smooth, quiet operation.

As a minimum provide and install new bearings in each of the sheaves and regroove sheaves that are imprinted worn or otherwise damaged.

2.38. New Hoisting Machine

Remove the existing expanded metal screen between the hoistway and the machine room to conduct the work. Provide a new openwork enclosure separation in the opening between the hoistway and the machine room around the new elevator machinery. The screen shall comply with the relevant B44 Elevator Safety Code requirements and shall protect the opening around the new elevator equipment.

Provide a new geared basement traction machine to replace the existing machine. Provide a new machine with integrated deflector sheave mounted to a common machine base to eliminate the need to fasten the deflector sheave to the building structure.

Remove and dispose of the existing machine room deflector sheave and mounting assembly attached to the ceiling structure in the machine room.

The machine shall be of the geared traction type with motor, brake and traction drive sheave compactly mounted on a continuous bedplate and set on steel beams. Mount the new machine on a bedplate designed to adapt to the existing tie down provisions. Provide approval of the bedplate adaptation by a Registered Professional Engineer.

Sound isolation pads shall be installed beneath the machine bedplate to reduce vibration and noise transmission to the building structure. Mount the machine on sound isolating pads, and provide complete sound isolation from the building in all directions.

Provide any and all alterations and restoration required to the concrete machine pedestal and rough opening between the machine room and hoistway to permit proper fastening of the new machine bedplate assembly to the existing structure. Provide review and approval of the existing structure and machine tie-down by a Registered Professional Engineer and provide copies of this to the Owner and to the Elevator Consultant

Provide a machine with a traction sheave suitable for a single wrap drive.

The Elevator Subcontractor shall be responsible for any alterations that may be required to bring in and install the new equipment including crane or hoisting requirements, permits, removal and reinstallation of doorways, railings, stairs, ships ladders, cutouts in the machine room partition, etc.

The new machine shall be provided with a new auxiliary braking device as specified elsewhere.

Provide a machine with a new AC drive motor suited to the speed and capacity with a slip specification of 5% or less.

The machine and all elevator machine room equipment shall be rated for operating in a machine room environment that is regulated between 5 and 40 degrees Celsius with 95% non-condensing humidity.

Provide a new machine with a quiet drum brake mechanism. Do not provide a machine with a disc brake assembly.

The following manufacturers of geared hoisting machine products are approved for use on this project:

- Titan Machine Corp
- Hollister Whitney

2.39. Machine Safety Guards

Provide safety guards over the rotating portions of the machine including the sheaves, hoist ropes, governors and any exposed portions of the new motor if applicable.

Guards shall be fastened to the machine to protect workers and maintenance personnel from the hazards associated with the open rotating equipment and shall have hinged inspection covers to permit visual inspection of hoist ropes, for lubrication, etc. without the need to fully remove the guards.

Provide guards in accordance with the requirements of clause 2.10.1 of the B44-07 Elevator Safety Code.

2.40. Auxiliary Braking Device

Provide an auxiliary braking device which acts on the elevator ropes or traction sheave to comply with the CSA-B44-07 Safety Code for Elevators.

Mount the device securely to the drive machine bedplate, machine beams or other suitable location with bolts of adequate strength for the forces generated during the activation of the device in both directions of travel with up to 125% capacity in the elevator. Do not weld the device or its mounting onto the supporting structure.

The device shall be mounted in a location such that it can be readily serviced. If it is necessary to mount the device in an inaccessible location then access platforms, openings or any other additional provisions shall be provided by the Elevator Subcontractor.

Where the device cannot be secured to the existing machine bedplate or frame, provide mounting details and drawings approved by a Registered Professional Engineer. Provide approval of the structural loads placed on the building by a Registered Professional Engineer.

2.41. Ride Quality

Statically balance the car to hang plumb in the hoistway with no load and the car doors in the fully closed position.

The horizontal peak to peak acceleration, both side to side and front to back shall not exceed 15 millig where g is the acceleration of gravity.

2.42. Governor, Governor Rope and Idler

The car safety shall be operated by a centrifugal speed governor located at the top of the hoistway. The governor shall be calibrated as required by the applicable safety code.

Provide a governor overspeed switch which shall be calibrated to actuate at not more than 90% of the governor trip speed in either direction of travel, or as otherwise required by the applicable safety code. When actuated the switch shall disconnect power to the motor and apply the brake before application of the safety.

Provide a new self resetting centrifugal governor to replace the existing governor complete with new governor rope and new idler sheave assembly in the pit. Provide means to remotely activate the governor from the machine room for testing purposes.

Note that access to the governor will not be provided from outside of the hoistway.

2.43. Counterweight

The existing counterweight shall be retained and re-furbished.

Statically balance the counterweight with the guides removed so that they hang plumb in the centre of the rails.

Balance the counterweight so that it is equal to the weight of the empty cab plus approximately 40 to 50% of the rated capacity to suit the original equipment design or new requirements.

Provide a sign in the pit to indicate the maximum counterweight runby if not already in place.

2.44. Hoist Ropes

Provide new hoist ropes and new wedge clamp rope fasteners to replace the existing ropes and rope clamps.

Ropes shall be of traction steel of size, construction and number to insure proper operation of the elevator and give satisfactory wearing qualities. Rope fasteners shall be of the wedge clamp type.

2.45. Three Phase Power Supply

The existing three (3) phase power supply voltage and other characteristics for the elevator shall remain unchanged.

2.46. Controller

Provide a micro-computer based control system to perform all of the functions of safe elevator motion. Included shall be all of the hardware required to connect, transfer and interrupt power, and to protect the motor against overloading.

Equipment shall be suitable for operating in a machine room environment between 5 and 40 degrees Celsius with 95% non-condensing humidity.

Each controller cabinet containing memory equipment shall be properly shielded from line pollution. The micro-computer system shall be designed to accept reprogramming of common variables on site. As a minimum the following variables shall be site programmable:

- a) Door Open, Close and Dwell Times
- b) Acceleration, Deceleration & Jerk Rates
- c) Parking Floors and Options
- d) Recall Levels

The controller shall be provided with on-board diagnostics and status indicators as an integral part of the controller to aid in troubleshooting, adjusting and maintenance of the equipment. Permanent status indicators shall be provided to indicate the status of the following as a minimum:

- a) Safety Circuit
- b) Door Locks
- c) High Speed
- d) Independent Service
- e) Inspection Operation
- f) Emergency Recall Operation
- g) Out of Service Timer
- h) Drive Failure

On-board diagnostics shall include an event and fault log, a real time clock and a method of displaying the status of all inputs, outputs and internal variables. Provide switches, push buttons, a display and instructions to view the diagnostic information. Provide non-proprietary diagnostics.

The control system shall have non-proprietary diagnostics and have technical support and spare parts available to any qualified party.

The following manufacturers and controller products are approved for use on this project:

- GAL – Galaxy 4
- MCE – Motion-4000
- Elevator Controls – Pixel

2.47.

2.48. Variable Speed Drive – AC VVVF

Provide a closed loop variable speed drive system which uses a software program and mathematical methods to generate an optimum motion profile of the car travel from the origin floor level to the destination floor level. The drive shall utilize solid state devices to control the brake and motor input to provide stepless acceleration and deceleration and regulation at all speeds.

Provide an AC VVVF drive of the flux vector type to suit the existing AC motor with a slip specification of 5% or less or provide a new motor if necessary to suit the new drive. The drive shall use power semiconductor devices and pulse width modulation with a carrier frequency of not less than 2 kHz, to synthesize the three phase output to operate the hoist motor in an essentially synchronous manner. The drive shall be capable of producing full torque at zero speed.

Means shall be provided for the absorption of regenerated power during dynamic braking. This power shall be dissipated in a resistor bank which is separated from the remainder of the control system.

Indicate in the submission the separate, optional extra price to provide a fully regenerative drive system to return power generated during dynamic braking or running with overhauling loads to the power supply lines.

Provide isolation transformers and filtering to eliminate both electrical and audible noise from the drive. The total harmonic and individual harmonic distortion shall not exceed 5% and 3% respectively and the requirements of IEEE-519 shall be adhered to with respect to power harmonics. For purposes of measurement the Point of Common Coupling (PCC) shall be defined as the elevator power supply terminals located in the elevator machine room.

Provide a line reactor between the AC Drive and the Hoist Motor. The line reactor shall be suitably sized to the horsepower rating of the hoist motor. The reactor shall be installed as close as possible to the drive unit.

Circuitry shall be designed and provided with filters to reduce and eliminate electromagnetic interference (EMI), radio frequency interference (RFI) and associated noise when the elevator is operating. The electromagnetic noise level with the elevator running shall be limited to not more than 0.1 dB above the ambient electromagnetic noise level when the elevator is stopped. The electromagnetic noise level at 10 KHz and with the elevator running shall be limited to not more than 0.01 dB above the ambient electromagnetic noise level when the elevator is stopped. The electromagnetic noise levels shall be measured in the elevator machine room with a calibrated radio frequency receiver and a calibrated rod or loop antenna.

The drive and drive cabinets shall be equipped with a suitable cooling system consisting of fans or other means to maintain drive components at a reasonable operating temperature and to exhaust heat from the cabinet. The drive and all elevator machine room equipment shall be rated for operating in a machine room environment that is regulated between 5 and 40 degrees Celsius with 95% non-condensing humidity.

The following manufacturers and drive products are approved for use on this project:

- Magnetek – HPV900
- MCE – Torqmax/KEB

2.49. Feedback Devices

Provide a dual loop feedback system for the car position and velocity.

A velocity feedback encoder shall provide continuous comparison of the actual car speed to the calculated velocity profile to provide precise control of the acceleration and deceleration up to the final stop.

An incremental car position feedback device shall be provided to accurately feedback the exact position of the elevator cab with an accuracy of $\pm 1/8''$ at any point in the hoistway. Absolute floor number encoding shall be provided at each floor level to establish exact floor position. The system shall not require movement to a terminal landing to determine correct car position. Car position information shall be stored in non-volatile memory to prevent loss of position and permit resumption of normal operation following power loss.

The elevator brake shall be provided with a switch or switches which shall monitor and feedback the status of the application of the brake.

2.50. Security Card Access Interface

Provide an interface as follows to connect the new elevator control equipment to a future restricted access security system:

Floor Selective Car Call Control. Provide a pair of input terminals for each car call for each elevator controller. Connect circuitry to the elevator control system such that an external closed contact at the input terminals shall permit registration of the car call and an open contact shall render the car call inactive.

Arrange that the elevators will park at the last call served or the main lobby. If the control system includes other forms of parking where an elevator is assigned to and moves to a zone to park arrange that this feature will be disabled when the security system is active or that the activation of the door open button will cause the elevator to travel to the main lobby and open its doors if a car call is not registered for the landing.

Arrange internally that the restricted access system and circuitry shall be bypassed when the elevators are switched to in-car emergency service operation.

Arrange the circuitry so that Independent service operation does not bypass the restricted access security system.

Provide the input and output terminals and terminate the wiring from each elevator on terminals located in clearly marked demarcation boxes mounted on the exterior of the elevator control cabinets or in a centrally located demarcation box located in the elevator machine room. The security systems contractor shall provide all wiring and conduit from the demarcation boxes to the security system equipment in the future.

Arrange to test the interface under simulated circumstances with the Elevator Consultant.

2.51. Seismic Restraint & Operational Features

Provide protection for seismic risk zone 3 or greater as required by the regulatory authority for the proposed alterations.

All equipment shall be mounted and secured to the building structure to prevent displacement or toppling when subjected to horizontal seismic forces resulting in accelerations equal to $\frac{1}{2}$ the rate of acceleration of gravity.

The foregoing items shall all be included in the basic proposal and price for the elevator upgrades.

2.52. Traction Elevator Emergency Battery Levelling Device - Optional

Indicate in the submission the separate optional extra price to provide a battery powered emergency levelling device for the traction elevators as follows:

A means of automatically raising or lowering the elevators shall be provided when there is a power failure. This operation shall bring each car to the next available landing and open the elevator doors to allow passengers to exit the elevator. A separate battery operated power supply system shall be provided for this operation.

The operation of the device shall conform to B44-07 section 2.27.3.1.6.(n)

3. Execution

3.1. Car Balancing

The car shall be balanced by means of balance weights to hang plumb in the hoistway with the doors closed and no load in the cab.

3.2. Grounding

Ground the control system and all field apparatus using colour coded bonding wire.

The occurrence of a single accidental ground or short circuit shall not defeat any safety device and shall not permit the car to start or run if any hoistway door or gate interlock is unlocked or if any hoistway door or car door gate contact is not made.

3.3. Sound Isolation

Isolate all equipment producing noise and vibration from the building structure using sound and vibration isolation mounts. This shall include but not be limited to contactors, electronic drive components, controller cabinets and transformers.

3.4. Car Out Of Service Operation

If the car is delayed from leaving a landing for a predetermined, adjustable time while there are calls in the system, the car shall be taken out of normal service and removed from group operation.

The car shall be automatically restored to normal group operation once the delay is corrected.

3.5. Door Operation

Door operation shall be automatic at each landing with opening being initiated as the car arrives at the landing and closing taking place upon expiration of a predetermined adjustable time interval. A minimum of three separate and independent door dwell times shall be provided. Doors shall remain open for an adjustable time period as follows:

- a) A car call time shall predominate when a car call only is being answered.
- b) A hall call time shall predominate when a hall call or both a hall call and car call are being answered.
- c) A short door time value shall predominate after door reversal from the door detector or door open button.

The values for the timers shall be independently field adjustable.

3.6. Door Nudging Operation

If there is either a hall call anywhere in the group or a car call in the car in question and the doors are prevented from closing for a fixed time period, the door protective device shall be rendered inoperative, an audible signal shall sound on the car and the doors shall close at reduced torque. Normal operation shall resume at the next landing reached by the car.

Arrange that the nudging feature can be easily disconnected or disabled in the field so that the audible signal will sound but the doors will not close until such time that the door detector system indicates that the entrance is clear.

3.7. Door Failure Protection

If the doors fail to fully close or open within a predetermined, adjustable time period further attempts to open or close the doors shall cease and the doors shall return to the open or closed position.

After a short time period the control system will attempt to complete the door cycle in a similar manner. In the event that three consecutive failures occur the car shall be removed from service and shutdown by the control system.

3.8. In-Car Lantern Operation

In car lanterns shall illuminate to indicate the direction of travel when answering a hall or car call. A chime shall sound once for “Up” and twice for “Down” to indicate the direction of travel of the elevator as the doors are opening or an appropriate voice announcement shall be made

In car lanterns shall activate at the initiation of the door opening cycle. The illumination shall remain active until the door dwell open time has elapsed.

Do not activate lanterns upon a door reversal unless the car is reversing its direction of travel.

3.9. Advance Door Opening

Arrange that the doors commence opening as the car is levelling into the landing. The amount of advanced opening shall be consistent regardless of the direction or travel and load in the car and in no case should the doors be open more than 2’ before the car stops level with the landing.

3.10. Performance Criteria

The equipment provided shall be capable of operation within the following performance criteria and shall be adjusted accordingly:

Motion Control					
Elevator # or Group	Maximum Flight Time	Maximum Acceleration	Maximum Jerk	Levelling Accuracy	Speed Variation
#1	10.5	3.5 ft/s ²	8.0 ft/s ³	+/-1/8”	+/- 2%

The flight time shall be measured from the start of the door close cycle until the doors are ¾ open at the adjacent landing on a one floor run between typical floor levels. This time is based on the existing floor

heights at the site. The flight time, levelling accuracy and speed variation shall be obtainable in both directions of travel with loads ranging from zero to full rated capacity.

Door Operation					
Elevator # or Group	Maximum Door Opening Time	Maximum Door Closing Time	Maximum Car Call Door Dwell Time	Maximum Hall Call Door Dwell Time	Maximum Short Door Dwell Time
#1	1.8	2.5	3.0	5.0	2.0

The Owner may request that the door operation be adjusted to other levels more appropriate for the specific tenancy or building environment. Arrange to perform such adjustments only upon mutual agreement and confirmation in writing of the agreed to adjustment times.

Maximum Acceptable Noise Levels			
Elevator # or Group	Door Operation	Cab	Machine Room
#1	60 dBA	70 dBA	80 dBA

Noise levels shall be measured no further than six feet from the noise source with the meter on the "A" scale with a slow response.

3.11. Inspection Operation

An enabling switch shall be provided in the car operating panel to permit operation of the elevator from on top of the car for inspection purposes, and shall make car and hall buttons inoperative.

On top of the car an operating fixture shall be provided containing continuous pressure "UP" and "DOWN" buttons, an emergency stop button, and a toggle switch. This toggle switch makes the fixture operable and, at the same time, makes the door operator and car and hall buttons inoperative. The operating station shall be located such that it is visible and easily accessible when accessing the car top from a front opening.

3.12. Hoistway Access Operation

An enabling switch shall be provided in the elevator car operating panel or service cabinet to render all car and hall buttons inoperative and to permit operation of the elevator by means of an access keyed switch adjacent to the hoistway entrance at the access landing(s). The movement of the car away from the access landing, by means of the access keyed switch at the landing shall be limited in travel and direction in accordance with the governing safety code.

3.13. Independent Operation

A switch shall be provided in the car operating panel which, when actuated, shall cancel previously registered car calls, disconnect the elevator from the hall buttons, and allow operation from the car buttons only. Door operation shall occur only after constant pressure on the DOOR CLOSE button or on a CAR CALL button.

When on independent operation the elevator shall not activate any hall or in-car lanterns.

3.14. Automatic Self-Levelling

The car shall be equipped with two-way levelling to automatically bring the car level at any landing regardless of direction of travel and with a load ranging from zero to full rated capacity.

3.15. Firefighter's Emergency Operation

Provide Phase I emergency recall and Phase II emergency in-car operation for the elevator in compliance with the CSA-B44-07 Safety Code for Elevators.

Provide full automatic recall operation as initiated by smoke detectors that are part of the building fire alarm system including recall to a designated level and recall to an alternate level. Provide machine room, pit and hoistway fire alarm device recall activated by signals from sensors in the elevator machine room, pit and hoistway where provided.

Provide clearly labelled terminals for the connection of signals from the building fire alarm system including general alarm, alternate floor recall input, machine room sensor inputs, pit input, hoistway input, etc.

Emergency recall operation to return elevators non-stop to a designated floor, shall be initiated by the building fire alarm system or by keyed switches located at the Ground floor lobby.

The Elevator Subcontractor shall provide terminals on the new control system to accept signals for recall to the designated level, alternate floor recall, machine room, pit and hoistway device recall as applicable. The fire alarm interfacing signals shall be provided by others as part of the related work that is not part of the Elevator Subcontractor's work.

A keyed switch shall be provided in each car for emergency in-car operation by emergency personnel.

The elevator shall NOT be designated for use by Firefighter's. Do NOT provide fire hat signs at the elevator door frames at any levels.

Provide floor identification numbers on the hoistway side of the hall door panels to identify each floor level, if not already in place.

The recall levels shall be as follows subject to approval by the regulatory authorities:

Elevator #	Main Recall Level	Alternate Recall Level
#1	"G"	"2"

3.16. Standby Power Operation

The building is not currently provided with a standby power generator that is capable of providing power for the elevator system, however, future changes may be made in this regard.

Include provisions in the elevator control system and hoistway wiring for the possible future connection of emergency standby power for the elevator and an elevator emergency power indicator at the ground floor level.

No indicators shall be provided at this time.

3.17. Simplex Operation

Operation shall be simplex selective collective automatic. The operation of one or more car or hall call buttons shall cause the car to start and run automatically. The car shall stop for the first car or hall call registered for the direction of travel. Stops shall be made in order in the direction of travel as the respective landing is reached. Regardless of the order in which they were registered. When only hall calls are registered ahead of the car for the opposite direction of travel then the car shall proceed to the furthest hall call, reverse the direction of travelling and commence collecting calls in that direction.

3.18. Parking of Elevators

Zoned or parked cars shall park with doors closed.

The elevator shall park at the last floor served or at any one of the landings served as selected by the Elevator Consultant. This parking selection shall be field adjustable. Initially arrange that the elevator will park at the last floor served unless otherwise instructed in writing.

3.19. Temporary Maintenance Period

Upon commencement of work on the site the maintenance of the elevator shall become the responsibility of the successful Elevator Subcontractor.

Normally the elevator will be out of service, however, should the elevator be returned to operation prior to substantial completion of the work the successful Elevator Subcontractor shall be responsible for the maintenance of the equipment during this time period. Provide full maintenance of the equipment from the date the work commences on site until substantial completion of the project. Provide a 24 hour callback service and answer all calls at no extra cost to the Owner.

The costs for the temporary maintenance shall be included in the basic quoted price.

Provide the maintenance service in conformance with the minimum standards set out in the B44.2-07 Elevator Safety Code Maintenance Requirements and Intervals.

The price for temporary maintenance shall not be subject to adjustment or escalation.

It is the intent that the successful Elevator Sub-contractor will commence maintenance services once the initial abatement work commences and prior to performance of the balance of the work.

3.20. Warranty Maintenance Period

A quality full maintenance service shall be provided for the elevators by the Elevator Subcontractor for a period of twelve (12) months after substantial completion of the project to coincide with the 1st year of the warranty period.

The costs for the 12 month warranty maintenance period shall be included in the basic quoted price.

Indicate in the submission the separate optional extra amount to provide maintenance of the elevator for one additional twelve (12) month period. That is, provide a separate price for maintenance of the elevator for the 2nd year of the 2 year warranty period (the price for the 1st year maintenance service should be included in the basic quoted price for the upgrading work).

Provide the maintenance service in conformance with the minimum standards set out in the B44.2-07 Elevator Safety Code Maintenance Requirements and Intervals.

The price for warranty maintenance period shall not be subject to adjustment or escalation.

3.21. Renewable Maintenance – Separate Price

Indicate in the submission the monthly rate for a renewable full preventative maintenance service for the elevators following the expiration of the included warranty maintenance period and optional extension if that is accepted. This shall be based on a five (5) year term contract. Acceptance of the on-going renewable maintenance service shall be at the sole discretion of the Owner.

Provide the maintenance service in conformance with the minimum standards set out in the B44.2-07 Elevator Safety Code Maintenance Requirements and Intervals.

The Elevator Subcontractor shall provide a copy of the maintenance agreement that the Owner would be requested to enter into as part of the submission. This shall be based on a five (5) year term contract.

3.22. Maintenance Training

Prior to commencement of the warranty maintenance period and any extended maintenance all Elevator Subcontractor's regular maintenance personnel and key maintenance personnel shall receive certified factory training for the preventative maintenance, repair and trouble-shooting of the new equipment, control systems and software provided. The Elevator Subcontractor shall be required to provide proof of this certification and training to the Elevator Consultant and the Owner as a requirement of Substantial Completion.

3.23. Signs

Signs shall be provided in the main lobby area of the building to inform residents, staff and other users of the elevator that elevator work is in progress. The signs shall be provided by the Elevator Subcontractor for display over the duration of the project. The design of the signs shall be subject to the Owners approval.

The Elevator Subcontractor shall also provide simple paper signs (8 ½" x 11") at each floor level on the doors of the elevator that is currently out of service.

3.24. Samples and Drawings

After award of the contract and prior to commencing any work on site submit shop drawings, samples and approval forms for the review and approval of the Owner and/or the Elevator Consultant. As a minimum the following shall be submitted:

- a) A copy of the alteration submissions provided to the regulatory authorities.
- b) Shop drawings for all car and hall operating and signal fixtures.
- c) Machine Room Layout drawings showing placement of all new equipment.
- d) Shop Drawings for new Machines and Mounting.
- e) Shop Drawings for new Cab Interiors.
- f) Samples of materials for car cab interiors for approval.
- g) Sample push buttons for approval.
- h) Sample tactile markings for approval.

- i) Power confirmation forms confirming power requirements for new equipment being provided.
- j) Voice Announcer Approval Forms (Optional).

3.25. Manuals

Upon completion of the project submit hand over documentation for all of the new equipment provided. As a minimum the following shall be provided:

- a) Complete operating and maintenance manuals.
- b) As built wiring diagrams.
- c) A minimum of five (5) copies of each key used except keys specifically for maintenance and inspection personnel.
- d) One (1) archive copy of all software used in the control system, door operator, etc..

Operating and maintenance manuals and wiring diagrams shall be submitted as one (1) original copy and also as an electronic file. The electronic file shall be created and provided by the Elevator Subcontractor upon completion, submission and approval of the original documentation by the Owner and Elevator Consultant. The electronic file shall be an exact copy of the original information submitted and shall be provided in portable document format (PDF). Ideally one complete electronic file would be provided, however. It will be acceptable to have one file containing the O & M manual, parts lists, etc. and another for the electrical schematics.

Operating and maintenance manuals shall be sufficiently detailed and shall include spare parts lists, As-Built drawings, adjustment procedures, testing procedures, troubleshooting procedures, diagnostic instructions, recommended spare part list and the manufacturer's recommended maintenance tasks and frequencies.

It is understood that the software provided shall be for archive purposes only and shall be for the Owner's exclusive use. A non-disclosure agreement will be signed by a representative of the Owner if required to protect the manufacturer's rights to the exclusivity of the software.

One (1) complete set of wiring diagrams shall be laminated and left on site in the machine room in addition to the foregoing requirements.

3.26. Special Tools

Provide any and all special tools used in the maintenance, repair, adjustments, troubleshooting and diagnostics of the equipment provided.

Special tools provided shall be for the exclusive use of the Owner or the Owner's contracted maintenance personnel and for the on-going maintenance, repair, adjustment, troubleshooting and diagnostics of the equipment.

3.27. Schedule

Submit a detailed completion schedule showing start dates, completion dates and milestone dates for the duration of the project. The schedule shall be sufficiently broken down to identify individual tasks or elements of the work. The schedule shall be reviewed regularly and revised according to the progress of the work.

Indicate in the submission the anticipated manufacturing lead time from award until delivery of materials to site to commence work and the anticipated shutdown duration for each elevator in weeks.

3.28. Schedule for Minimum Disruption – Optional

The building has residents that are reliant on the operation of the elevator and an overall reduction in the amount of downtime would be beneficial.

Indicate in the submission the optional extra cost and alternative schedule to reduce the overall downtime of the elevator to minimize the impact on the tenants.

The intent would be to perform as much preliminary work as possible in advance of a complete shutdown where the elevator could be returned to service at night and on weekends. A complete shutdown would then be performed for the switching over of the control system, motor and other components. Once the major switchover is complete and accepted the remaining work would be completed in a similar manner to the preliminary work whereby the elevator would be returned to service in the evenings and on weekends.

The reduced downtime schedule shall be based on performing the work with one complete shutdown that would be no more than 6 calendar weeks including final adjusting testing and inspection with the regulatory authority. Allow for overtime inspection and testing with the regulatory authority as required to achieve this schedule. Weekday, daytime shutdowns shall be permitted before and after the complete shutdown period for pre-work and completion of the project.