

PART I GENERAL

1.1 SCOPE OF WORK

- 1.1.1 The work described herein includes for all labour and material, including overtime required to meet the agreed project schedule, to upgrade one (1) hydraulic passenger elevator complete with new non-proprietary electrical controller, pumping unit, valve, motor and oil storage tank. Work includes:
- 1.1.2 Supply and install new vandal resistant stainless steel illuminated car and hall push buttons to comply with handicapped requirements.
- 1.1.3 Supply and install new heavy duty car door operator and clutch assembly, hoistway and door-lock contacts.
- 1.1.4 Supply and install battery lowering operation.
- 1.1.5 Supply and install new car-cab interior.
- 1.1.6 Supply and install new cantilevered hydraulic jack system including cylinder, piston and hydraulic line back to machine room.
- 1.1.7 Removal and disposal of all redundant elevator equipment.
- 1.1.8 This is a brief description, specifications detail complete work.

1.2 RELATED WORK

- 1.2.1 To Be Carried Out by the Elevator Contractor:
 - 1.2.1.1 Provide increased pit lighting through the addition of at least one dual-tube fluorescent fixture.
 - 1.2.2 To Be Carried Out by the Owner:
 - 1.2.2.1 Provide temperature control elevator machine room to 10 - 32 degrees Celsius.
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- 1.2.2.2 Provide required fire signals to elevator controller including detector at each floor level, machine room signal and hoistway signal.

1.3 PROCEDURE

- 1.3.1 Notify the Owner and Consultant in writing, at least two (2) weeks prior to removing the elevator from service.

1.4 FIRE AND SAFETY REQUIREMENTS

- 1.4.1 Comply with Provincial Building Code, Health and Safety Measures at Construction and Demolition Sites and Provincial Regulations for Construction Projects.
- 1.4.2 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.
- 1.4.3 Comply with owner's site security and safety regulations.
- 1.4.4 Comply with Owner's Hot Works policy including as required by the sample permit distributed with this tender.

1.5 POWDER ACTUATED FASTENING DEVICES

- 1.5.1 Do not use powder actuated tools using explosives, unless permitted expressly by the Consultant; comply with requirement of CAN3-Z166.2. (Use and Handling of Powder Actuated Tools.)

1.6 CUTTING, PATCHING AND MAKING GOOD

- 1.6.1 Cut existing surfaces as required to accommodate new work.
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- 1.6.2 Patch and make good surface cuts, damaged or disturbed, to Consultant's approval. Match existing material, colour, finish and texture.

1.7 BUILDING SMOKING ENVIRONMENT

- 1.7.1 Do not smoke inside building.
- 1.7.2 Direct Contractors, sub-contractors, suppliers, delivery people, to obey smoking restrictions.

1.8 DUST CONTROL

- 1.8.1 Provide dust tight screens or partitions to localize dust generating activities and for protection of workers, finished areas of work and public.
- 1.8.2 Maintain and relocate protection as required until such work is completed.
- 1.8.3 Protect all furnishing within work area with low fire spread tarps or screen during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.

1.9 SCHEDULING

- 1.9.1 Within two (2) weeks after award of contract, submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Consultant take necessary measures to complete work within scheduled time. Do not change schedule without notifying Consultant.
- 1.9.2 Include, in this schedule, the following information:
- 1.9.2.1 Material lead time;
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1.9.2.2 Modernization construction time;

1.9.2.3 Adjustment and finish-up time;

1.9.3 Provide a detailed cost breakdown schedule for invoicing purposes.

1.10 OCCUPIED BUILDING

1.10.1 Make allowances for the Work being carried out in an occupied building including that there will be children near the work area.

1.10.2 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.

1.10.3 Do not use solvents or other products in quantity that is objectionable to building tenants.

1.10.4 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 Owner or Consultant.

1.10.5 Where excessive noise or obstruction is unavoidable, make arrangements with the Owner 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 Consultant mall building operations are being affected including:

1.10.5.1 Noisy work that is clearly audible outside of the work space.

1.10.5.2 Work generating fumes or noxious odours such as may arise from welding and PVC glue.

1.10.5.3 Disruptive work involving moving large materials through the tenant spaces.

1.11 PROTECTION OF HOISTWAY AND WORK AREA

- 1.11.1 Comply with Canadian Code for Construction Safety, the Provincial Construction Safety Act and Provincial Regulations.
- 1.11.2 Erect hoarding at any floor where there is an unlocked elevator hoistway door.
- 1.11.3 On removal of hoardings, make good damage to surfaces of walls, floors and ceilings.
- 1.11.4 Fasten by bolts plywood hoarding from floor to height of 2134 mm, 12 mm thick and at least as wide as the elevator entrance.
- 1.11.5 Use hoarded entrance for removal of redundant material and delivery of new equipment.
- 1.11.6 Protect existing floors by covering with 12 mm plywood and tarpaulins, when removing or delivering materials.
- 1.11.7 Create a work space inside hoardings of at least 1200 mm deep.

1.12 GENERAL CONDITIONS

- 1.12.1 General requirements section and all other conditions apply to all the Work and are part of this section. Read in full all sections included in the specification document. Adapt this Work to that of the other trades.
 - 1.12.2 Indemnify and save the Owner harmless from liability directly arising from the Contractor's completion of the Work, including but not limited to personal injury, equipment damage, property damage and expense for, or on account of, any unpatented or patented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner. Said liability may arise from an act of the Contractor, or his sub contractor or supplier of products, material or services, or from the omission or delay in carrying out any portion of the Work.
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- 1.12.3 The Contractor shall not be liable for any loss, damage, or delay caused by acts of government, labour strikes, labour lockouts, riot, civil commotion, war, malicious mischief, acts of God or other cause beyond their reasonable control.
- 1.12.4 Perform the erection of this equipment by certified Elevating Device Mechanics skilled in the installation of elevator machinery and elevator entrances. Provide adequate supervision of this work. Dress all construction personnel in company uniforms or coveralls identified with the Contractor's name and logo.
- 1.12.5 Continuously maintain adequate protection of the Work from damage and protect the Owner's property from injury or loss. Make good any damage, injury or loss arising from Work except if not caused by the Contractor, its agents, sub contractors or suppliers.
- 1.12.6 Remove rubbish daily as it accumulates. Keep the building and premises clean during the progress of the work.
- 1.12.7 Perform the Work in compliance with all applicable provisions of all Federal, Provincial and local labour laws.
- 1.12.8 Be registered and in good standing at all times with the Workplace Safety and Insurance Board.
- 1.12.9 Carry and pay for premises liability insurance in the amount of \$5,000,000.00 inclusive, to be covered against any claims from damage to property or for personal injury, including death, which may arise from operation under this contract, whether such operation is carried out by the Contractor or by any Sub-contractor or anyone directly or indirectly employed by either of them.
- 1.12.10 Be responsible for all equipment, products, tools and material not turned over for use by The Owner, whether or not equipment, products, tools or materials have been certified or paid for by either or both the Owner and/or the Consultant.
- 1.12.11 The Work may be viewed by the Consultant at any time during construction.
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1.13 CONSULTANT'S CERTIFICATION OF PAYMENT

- 1.13.1 The Consultant will certify progress payments for work only after it has been installed.
- 1.13.2 Progress payments may be withheld for, weather or not certified by the Consultant, for any of the following:
 - 1.13.2.1 Defective work or deficiencies not corrected.
 - 1.13.2.2 Failure of Contractor to make payments properly to Sub-contractor(s) or for material and labour.
 - 1.13.2.3 Failure to work to schedule.
 - 1.13.2.4 Damage to the building or another contractor.
 - 1.13.2.5 Failure to meet specifications or performance criteria.

1.14 DEFINITION OF TERMS

- 1.14.1 The term "Contractor" as used herein refers to any person, partners, firm or corporation having a contract with the Owner to furnish labour and material for the execution of the work described therein.
 - 1.14.2 The term "Sub-contractor" as used herein refers to any person, partners, firm or corporation having a contract with the Contractor to furnish labour and materials for the execution of the work described herein.
 - 1.14.3 All of the terms in the specifications have the definitions given in the ASME A17.1-2010/CSA-B44-10 Safety Code for Elevators.
 - 1.14.4 The term "provide" or "furnish" where used, means to supply and install new equipment.
 - 1.14.5 The term "refurbish" where used, shall mean the provision necessary labour, modifications, parts, etc., which will result in returning the component to as-new operating condition.
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1.15 BID

- 1.15.1 Submission of bid will be considered presumptive evidence that Bidder is conversant with local facilities and conditions, requirements of the documents and of pertinent provincial and local codes, state of labour and material markets and has made due allowance in his proposal for all difficulties. Should Bidder's investigation of local codes or rules reveal stipulations contrary to the specifications, he shall advise the Consultant without delay. Should a Bidder find any discrepancy in, or omissions from any of the specifications, or be in doubt as to their meaning, he shall advise the Consultant. Bids are assumed to be in complete conformance with this specification unless explicitly written on the bid submission otherwise.

1.16 ELEVATOR TENDER

- 1.16.1 This tender covers all of the work to modernize one (1) passenger elevators to operating condition, including provincial approval.
- 1.16.2 The scope of this work and contract amount may be reduced at the Owner's sole discretion at time of tender award including the removal of one elevator from the scope of work.

1.17 REFERENCE STANDARDS

Complete work to the following standards as a minimum:

- 1.17.1 ASME A17.1-2010/CSA-B44-10 Safety Code for Elevators, including updates.
- 1.19.2 CSA C22. No.77 Motors with Inherent Overheating Protection.
- 1.19.3 CSA C22.2 No. 141 Unit Equipment for Emergency Lighting.
- 1.19.4 Provincial Safety Act and Regulations.
- 1.19.5 C22.1 Canadian Electrical Code, particularly Section 38.
- 1.19.6 National Building Code.
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- 1.19.7 CAN/CSA B651 Barrier Free Design
- 1.19.8 CAN/CSA Z320 Building Commissioning Standards.
- 1.19.9 Provide materials used in the work as specified in every respect, and with at least a three (3) year history of stable operation. Demonstrate these requirements if called upon to do so, prior to the awarding of any contract. Furnish for approval, all samples as directed and materials shall be in accordance with the approved samples.

1.18 MEASUREMENTS

- 1.18.1 Before ordering of materials, verify all dimensions with the actual site conditions.

1.19 SUMMARY DESCRIPTION OF SYSTEM

- TYPE: One (1) cantilevered hydraulic passenger elevator
- LANDINGS: Retain existing 3 stops to front.
B, G, 2
- DOORS: 32" x 84"
One-speed, side opening
- CAPACITY: Retain existing capacity of 1,500 pounds.
- SPEED: Retain existing speed of 75 fpm.
- PIT DEPTH: Per site conditions approx. 53"
- TRAVEL: Per site conditions approx. 22' 11"
- MOTOR HP: Do not exceed existing motor horsepower size.

ELEVATOR CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE

1.20 FEATURES

Provide Simplex Selective Collective Operation with special features:

- 1.20.1 Independent service operation;
- 1.20.2. Emergency battery lowering;
- 1.20.3. Firefighters Emergency Operation Phase 1 and 2.

For signals provide:

- 1.20.4 LED illuminated vandal resistant stainless steel buttons.
- 1.20.5 Car position indicator.
- 1.20.6 One hall position indicator at the main level.
- 1.20.7 Comply to Appendix "E" of ASME A17.1-2010/CSA-B44-10 code.

1.21 PERMITS AND INSPECTIONS

- 1.21.1 Obtain and pay for necessary Municipal or Provincial inspections and permits and make such tests as are called for by the regulations of such authorities. Make tests in the presence of the authorized representatives of such authorities.
- 1.21.2 Make application for Provincial approval of design submission immediately upon approval of shop drawings.
- 1.21.3 Provide the Owner and the Consultant with copies of applications and reports, the same day they are sent to or received from the inspection authority.

1.22 TAXES

- 1.22.1 Pay all taxes properly levied by law including Federal, Provincial and Municipal.
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1.23 SAMPLES

1.23.1 Submit to the Consultant, upon request, samples of elevator finishes for:

1.23.1.1 Signal and operating fixtures.

1.23.1.2 Interior cab finishes including stainless steel.

1.24 SHOP DRAWINGS

1.24.1 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.

1.24.2 Shop 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. 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 Documents.

1.24.3 Submit five (5) paper copies of each shop drawing for Consultant's review.

1.24.4 Indicate on layout drawings:

1.24.4.1 Pumping unit, controller and all other components in machine room.

1.24.4.2 Car, supporting beams, guide rails, buffers and other components in hoistway.

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

- 1.24.4.4 Location in hoistway or machine room for connection of travelling cables for car light and communication system.
- 1.24.4.5 Signal and operating fixtures.
- 1.24.4.6 Locations and size of trap doors and access doors and load on hoist beam and location of trolley beams.
- 1.24.4.7 Heat dissipation of elevator equipment in machine room.
- 1.24.4.8 Indicate on general arrangement drawings:
- 1.24.4.9 Detailed drawing showing all fixtures, position indicators, push buttons, car operating stations, corridor control panels, and any other special fixtures pertaining to the project.
- 1.24.4.10 Include catalogue illustrations of operating and signal fixtures.
- 1.24.4.11 Do not commence manufacture or order materials before shop drawings are reviewed.
- 1.24.4.12 Provide detailed elevator cab interior drawings for approval.

1.25 RECORD DRAWINGS AND DATA

- 1.25.1 Before final acceptance of the elevators, 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.
 - 1.25.2 Provide one soft copy of the above information in AutoCAD format.
 - 1.25.3 Mark-up in red colour changes or additions to original wiring diagrams.
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- 1.25.4 Submit drawings and data in accordance with project specification and General Requirements if applicable.

1.26 OPERATION AND MAINTENANCE MANUALS

- 1.26.1 Provide three (3) copies of manufacturer's instructions and operation and maintenance manuals.
- 1.26.2 Bind data in vinyl hard cover 3"D" ring type loose leaf binders for 212 x 275 mm size paper. Binders must not exceed 75 mm thick or be more than 2/3 full.
- 1.26.3 Enclose title sheet labelled "Operation Data and Maintenance Manual", project name, date and list of contents. Show project name on binder face and spine.
- 1.26.4 Provide Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- 1.26.5 Include the following maintenance data for each elevator:
- 1.26.5.1 Description of elevator system's method of operation and control including, but not restricted to, motor control system, emergency power operation, door operation, and special or non-standard features provided;
 - 1.26.5.2 Replacement parts list.
- 1.26.6 Provide legible schematic wiring diagrams covering all electrical equipment as supplied and installed, including all changes made in final work, with all symbols listed corresponding to identity or markings on both machine room and hoistway apparatus. Cover one (1) copy in plastic or glass, frame and mount in machine room. Include lubrication chart.
- 1.26.7 Include all wiring diagrams for all equipment on controllers.
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- 1.26.8 List information on each piece of equipment including:
- approval drawing number
 - model, part and serial number
- 1.26.9 Detail the following maintenance information:
- lubrication products and schedules
 - trouble shooting procedures
 - adjustment techniques
 - operational checks
 - maintenance of special finishes
 - planned maintenance tasks and their frequencies
- 1.26.10 List recommended spare parts to be maintained on site to ensure optimum elevator efficiency. List all special tools and appropriate unique applications. Detail manufacturer and supplier names and addresses.
- 1.26.11 Include in the manuals a copy of the registered design submission and Provincial inspection reports.

1.27 MAINTENANCE SERVICE

- 1.27.1 Provide complete maintenance of equipment, including monthly inspections, for a period of twenty (24) months from the date of the Final Certificate of Completion.
- 1.27.2 Carry out maintenance inspections and tests in accordance with provincial regulations, Section 8.6 of CSA B44-10 Safety Code for Elevators and Escalators, CSA Standard B44.2-10 Maintenance Requirements and Intervals for Elevators and the PWGSC standard Elevating Devices Maintenance Specification distributed with this tender, as a minimum.
- 1.27.3 Regularly, systematically, monthly examine, clean, lubricate and adjust any of the equipment.
- 1.27.4 Repair or replace electrical and mechanical parts of any equipment as required due to defect and normal wear and tear.
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- 1.27.5 Use only genuine standard parts of product line of manufacturer of equipment.
 - 1.27.6 Perform work by competent personnel under supervision and in direct employ of elevator manufacturer, or manufacturer's licensed agent.
 - 1.27.7 Schedule work during regular trade working hours, with Owner.
 - 1.27.8 The Elevator Contractor must have successful experience in the complete maintenance of elevators, employs competent and qualified personnel to handle this service, maintains locally an adequate stock of parts for replacement or emergency purposes and has qualified men available to insure fulfilment of this service in a reasonable time.
 - 1.27.9 Include 24 hour call-back service due to equipment stoppage or malfunction at all times at no additional cost.
 - 1.27.10 The elevator must be out of service longer than 12 hours - the Owner is to be completely informed on a continuing basis.
 - 1.27.11 Maintain a standard type locked metal cabinet, in machine room with a supply of parts known to require frequent replacement, acceptable lubricants and cleaning materials together with schematic wiring diagrams.
 - 1.27.12 Remove garbage at each examination.
 - 1.27.13 Paint machine room equipment, including floor, prior to completion of the project. On floor use two coats of grey floor enamel. On machinery - use machinery enamel.
 - 1.27.14 The Contractor is to advise the maintenance cost for the second year, to be used as a basis for subsequent years.
 - 1.27.15 Make available to the Owner's chosen long-term maintenance supplier, parts including solid-state boards or microprocessor programming, necessary for the proper servicing of the elevator.
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1.28 QUALITY OF WORK

- 1.28.1 Perform erection of this equipment by mechanics skilled in the installation of elevator machinery and elevator entrances.
- 1.28.2 Guard and protect the hoistway, from commencement to completion of the work.
- 1.28.3 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.

1.29 POWER SUPPLY

- 1.29.1 Make all necessary modifications to the electrical services relating to the elevators such as supplementary disconnect devices and connections to the controller.
- 1.30.2 Accommodate existing three-phase power supply.

1.30 USE OF ELEVATORS BY HANDICAPPED

- 1.30.1 Arrange all controls and fixtures to be easily reached and operated by disabled persons. Meet all requirements of Appendix "E" of the CSA-B44-10 Safety Code for Elevators.
 - 1.30.2 Provide flush mounted Arabic numerals 16 mm in height raised 0.8 mm immediately to left of floor buttons to identify floor buttons.
 - 1.30.3 Provide tactile indications (arabic), 50 mm floor numerals raised 0.8 mm, on the hoistway door panel jambs. Locate 1.5 metres above finished floor.
 - 1.30.4 Locate uppermost button in elevator cab control panel at less than 1220 mm above floor level.
 - 1.30.5 Sound audible soft-toned signal in car when car is passing or stopping at a floor.
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- 1.30.6 Include braille markings on car operating panel fixtures.
- 1.30.7 Provide new car-riding lanterns in both return jambs or if compatible with new equipment retain and refurbish existing system. Arrange lanterns to illuminate and chime, once for Up direction, and twice for Down.
- 1.30.8 Existing tactile plates on hoistway door jambs are to be retained.
- 1.30.9 Provide three (3) stainless steel handrails per cab, set at 850 mm from floor, with space of 40 mm between rail and cab wall.

1.31 MARKINGS

- 1.31.1 Make identifications and instructions in English and French or alternatively with international symbols.

1.32 TRADEMARKS AND LABELS

- 1.32.1 Do not place permanent labels, trademarks or nameplates on materials.

1.33 STORAGE AND HANDLING

- 1.33.1 Store materials in elevator machine room or other space authorized by the Owner.

1.34 WARRANTY

- 1.34.1 Warranty materials and workmanship of the apparatus installed under these specifications to be first-class in every respect and make good any defects, not due to ordinary wear and tear or improper use or care, which may develop within one (1) year from the date of acceptance.
 - 1.34.2 Use of elevator during construction period shall not affect this guarantee.
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1.35 NON PROPRIETARY GUARANTEE

1.35.1 Provide a written guarantee from the manufacturer of the equipment, including controller, that the equipment is non-proprietary. This includes:

1.35.1.1 Extra spare parts are available for purchase, not just exchange. Parts may be purchased by anyone, not just the building owner. A published price list is to be supplied upon demand.

1.35.1.2 All diagnostics are on board. All wiring diagrams and other documentation for maintenance are supplied with the elevator.

1.35.1.3 The elevator programming does not expire, self-alter or degrade in any way.

2. PART II PRODUCTS

2.1 COMPONENTS

- 2.1.1 Use major elevator components from standard product line of one manufacturer unless otherwise approved.
- 2.1.2 Use components only which have performed satisfactorily together under conditions of normal use in not less than three (3) other elevator installations of similar design and for a period of at least three (3) years. Furnish, if requested, names and addresses of Owners or Managers of buildings, in which proposed combination of major components has so performed.
- 2.1.3 Major components are defined to include cylinder and plunger, motor, pumping unit, muffler, controller, operation and control system.
- 2.1.4 Provide materials and equipment new, the best of their respective kinds and installed in a neat, accurate, workmanlike manner. Furnish to the Consultant samples as directed and material is to be in accordance with the approved samples.
- 2.1.5 Provide only system designs field tested for the application, with adequate capacity to meet all performance criteria and to provide long term, reliable operation.

2.2 ELEVATOR TYPE

- 2.2.1 Use direct acting plunger, pumping unit, storage tank and magnetic control valves.
 - 2.2.2 Locate pump unit and associated control equipment in existing machine room.
 - 2.2.3 Deliver operating fluid directly into cylinder at necessary pressure and in sufficient quantity to lift rated load at rated speed.
 - 2.2.4 Use oil as operating fluid with flash point at least 190°C.
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2.3 ELECTRICAL WIRING, CONDUIT AND FITTINGS

- 2.3.1 Furnish and install all new insulated wiring to connect all parts of the equipment.
 - 2.3.2 Use steel compression type fittings where electrical metallic tubing is used. Fittings with set screws are not acceptable unless a separately identified grounding conductor is also installed inside raceway.
 - 2.3.3 Provide new wiring from machine room disconnect to new controller.
 - 2.3.4 Provide a suitable communication system junction box on the outside of the controller and identify the wires. Provide uninterrupted shielded wiring from the autodialer in car to junction box located at controller in machine room.
 - 2.3.5 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Wiring shall be run in metal conduit, metallic tubing or wire ducts.
 - 2.3.6 Any of existing conduit or trough in good condition may be retained.
 - 2.3.7 Suitably suspend the travelling cables to relieve strain in the individual conductors.
 - 2.3.8 Run three-phase power wiring must in electrical metallic tubing or other galvanized steel raceway. Include a covered ground wire same size as feeders in the raceway.
 - 2.3.9 Include at least 10% spare conductors and two (2) pairs of shielded audio cables in travelling cables. Clearly identify these at the controller.
 - 2.3.10 Do not parallel conductors to increase current carrying capacity unless individually fused.
 - 2.3.11 Limit use of flexible conduit on car top to items that require movement or periodic adjustment. Provide all new wiring on car top.
 - 2.3.12 Do not use armoured flexible metal conduit as grounding conductor.
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2.3.13 Use threaded rigid galvanized conduit, electrical metallic tubing or other galvanized steel raceway.

2.3.14 Provide new type E.T.T. travelling cables.

2.4 FINISH

2.4.1 Paint machinery equipment with oil resistant machinery enamel unless otherwise specified.

2.4.2 Free structural parts of rust. Paint with rust resistant paint.

2.4.3 Do not use manufacturing techniques such as spot welding which may cause visual imperfections or visual distortion of exposed stainless steel.

2.4.4 Do not use exposed fastenings.

2.5 SOUND ISOLATION

2.5.1 Provide new resilient pads to effectively isolate pumping unit from floor and plungers from car frame.

2.5.2 Prevent lateral displacement of pumping unit.

2.5.3 Isolate any new oil line from building structure through the use of isolation hangers or rubber.

2.6 ROLLER GUIDES

2.6.1 Equip car with new roller guides mounted on top and bottom of car. Allow for custom guides as required by cantilevered rail attachment.

2.6.2 Provide minimum diameter of 83 mm.

2.6.3 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.

- 2.6.4 Provide guide operation, which is inaudible to passengers in car or outside hoistway with car operating at rated speed and car fan turned off.
- 2.6.5 Use roller tire material which will not develop flat spots after standing idle for 24 hours at 32 degrees C.
- 2.6.6 Provide each guide with durable, oil resistant and resilient tired ball bearing rollers to run on three finished rail surfaces.

2.7 PUMPING UNIT

- 2.7.1 Provide a complete new pumping unit.
 - 2.7.2 Design pumping unit as an integral unit combining motor, pump, valves and reservoir in one enclosure.
 - 2.7.3 Reduce airborne noise with sound deadening material, submerge pump and motor in oil reservoir.
 - 2.7.4 Provide swing panels or panels equipped with quick release fasteners for convenient access to parts of equipment requiring adjustment.
 - 2.7.5 Use positive displacement screw type pump with direct connection between drive motor and pump through flexible coupling, specially designed for quiet service.
 - 2.7.6 Where necessary, install oil tight drip pan beneath unit to retain leakage of hydraulic fluid.
 - 2.7.7 Install thermostatically controlled heaters or other means to maintain fluid viscosity within limits necessary to provide consistent, reliable operation at all times.
 - 2.7.8 Install thermostatic protection of oil temperature in reservoir where pump or motor is submerged in reservoir.
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2.8 MOTOR

- 2.8.1 Provide new pump motor. Do not exceed existing horsepower.
- 2.8.2 Do not exceed EEMAC Design B locked rotor current.
- 2.8.3 Design for minimum locked rotor torque of 150% and minimum breakdown torque 200% at normal voltage.
- 2.8.4 Provide data plate on motor showing motor connections.
- 2.8.5 Limit starting current of elevator motor to not more than four (4) times full load running current.
- 2.8.6 Include Class B motor insulation.
- 2.8.7 Include manually reset integral overheating protection to CSA C22.2.
- 2.8.8 Design motor for 100 starts per hour.

2.9 MOTOR CONTROLLER

- 2.9.1 Provide a CSA approved modular microcomputer controller to provide solid state soft starting.
 - 2.9.2 Provide the following protection during the starting and running modes.
 - 2.9.2.1 Start fault.
 - 2.9.2.2 Line fault.
 - 2.9.2.3 Temperature fault.
 - 2.9.2.4 Stall motor.
 - 2.9.2.5 Provide LED indicators for advisory status and fault annunciation.
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- 2.9.2.6 Design controller to be capable of delivering its rated current and ambient temperatures ranging from 32°F to 120°F.

2.10 SELECTIVE COLLECTIVE AUTOMATIC OPERATION

Provide simplex selective-collective automatic operation:

- 2.10.1 Provide one (1) operating device in the car with stainless steel faceplate containing flush mounted LED illuminated type vandal resistant stainless steel push buttons to correspond with landings served, keyed switch for car light, alarm button and keyed emergency stop switch.
- 2.10.2 When lifting rated load, do not permit car speed to vary from rated speed by more than 10%.
- 2.10.3 Arrange each car so that momentary pressure of one or more of its car buttons causes car to start.
- 2.10.4 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.
- 2.10.5 Return first car to clear all its calls to the first floor.
- 2.10.6 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.
- 2.10.7 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.
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- 2.10.8 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.
- 2.10.9 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.
- 2.10.10 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.
- 2.10.11 Cause the car to start before this time upon registration of a car button for another landing.
- 2.10.12 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.
- 2.10.13 Do not start car unless the car door is in the closed position and all hoistway doors are locked in the closed position.
- 2.10.14 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.
- 2.10.15 The main floor as described in this operation is Ground floor.
- 2.10.16 Provide independent service by means of key operated switch in car service panel which will allow the car to operate independently of hall calls.

2.11 MUFFLER

- 2.11.1 Minimize transmission of fluid pulsations in pipeline between pumping unit and cylinder head with blow-out proof muffler.
-

2.12 PIPING

- 2.12.1 Provide new piping from machine room to cylinder. Chip out any portion of the line grouted in place and patch.
- 2.12.2 Use threaded couplings or mechanical couplings which mechanically prevent separation of adjoining members.
- 2.12.3 Welding is permitted providing interior of pipe is thoroughly cleaned after welding or where welding method prohibits introduction of foreign material into interior of pipe.
- 2.12.4 Provide sound isolation couplings in pipeline between pump and cylinder.
- 2.12.5 Provide a gate valve, in the line to facilitate maintenance and adjusting of elevator.
- 2.12.6 Locate piping where it can be serviced. Buried piping is not acceptable.
- 2.12.7 Remove all redundant oil from existing buried piping.

2.13 OIL STORAGE TANK

- 2.13.1 Provide oil storage tank capacity equal to volume of oil required to lift elevator to top terminal plus reserve of not less than 40 litres.
 - 2.13.2 Clearly indicate minimum permissible oil level.
 - 2.13.3 Include gauge glasses to indicate oil level if top of tank is more than 1.5 metres above floor level.
 - 2.13.4 Provide filtering screen mounted over the suction inlet.
 - 2.13.5 Provide a drain connection.
-

2.14 LOW OIL CONTROL

- 2.14.1 Provide low oil control feature to automatically cause up-travelling car to descend to main landing if reservoir oil level is insufficient.
- 2.14.2 Arrange control so that oil reservoir must be refilled before elevator can be returned to service.
- 2.14.3 Open car and hoistway doors automatically at lower landing. Inactivate control buttons in car operating panel except door open button.

2.15 EMERGENCY LIGHTING

- 2.15.1 Retain and refurbish the existing ceiling-mounted cab emergency lighting system including new battery.

2.16 POWER FAILURE OPERATION

- 2.16.1 Include means to automatically return elevator to the lowest landing upon failure of normal power supply and independent of any building power source. Include door operation. Include battery device.

2.17 PASSENGER CAR ENCLOSURE

Refurbish existing car cab interior as described below:

- 2.17.1 Fabricate ceiling with sheet steel, minimum of 12 gauge, smooth and free from defects. Emergency exit to be of same fabrication and finish.
 - 2.17.2 Ventilate by an exhaust air handling unit through roof and through concealed perforations at base. Limit total fan noise to 65 dBA, measured on an "S" response scale, measured 0.9 m above floor with fan on high speed. Include two-speed operation of ventilation system.
-

- 2.17.3 Use bolts fitted with washers and lockwashers and fabric separators, as is necessary, for cab structure to operate free from squeaks or other objectionable sounds.
- 2.17.4 Provide an emergency exit on top of the car of suitable size, equipped with an electrical device which will prevent operation of the elevator if the exit cover is open more than 50 mm and designed to comply with elevator code.
- 2.17.5 Provide stainless steel licence holder in cab.
- 2.17.6 Provide an auto-dial, hands-free cab telephone including complete system as required to comply with Code requirements regarding communication within the building before forwarding to an outside number. Program telephone to number provided by Owner.
- 2.17.7 Reskin front wall, including return and entrance columns of Avesta, Deco 8, 20 gage stainless steel. Provide new matching car door.
- 2.17.8 Provide new raised fire-rated panels secured with hidden fastenings. Face panels with plastic laminate - to Engineer's choice from standard range of Nevamar and Formica. Finish reveals and base in brushed stainless steel.
- 2.17.9 Include overall fluorescent ceiling lighting using electronic ballasts and T8 lamps. Provide parabolic metal eggcrate 6 mm x 6 mm x 9 mm thick suspended ceiling, supported on metal hung type ceiling frame. Design for light intensity measured at car sill of 120 Lx minimum. Totally enclose and conceal wiring and ballasts from view within the car and finish ceiling cavity white.
- 2.17.10 Provide single-sheet vinyl tile flooring to Engineer's choice of colour.
- 2.17.11 Provide minimum car cab clear-inside dimensions of:
- 2.17.11.1 54" wide x 51" deep x 86" clear height.
- 2.17.12 Provide pad hooks and one (1) complete set of protective pads, including access walls per elevator.
-

2.17.13 Install new 6.5 mm x 150 mm stainless steel handrails on all non-accessible sides. Set at maximum height of 910 mm above floor with 38 mm clearance between wall and handrail. Return ends to walls.

2.17.14 Provide new nickel silver car threshold.

2.17.15 Provide new dual-speed cab fan. Provide a protective cover for fan on the car top.

2.18 STRUTS

2.18.1 Thoroughly examine all headers and strut angles in hoistway for proper fastening to building structure.

2.18.2 Securely fasten any loose headers or struts.

2.19 GUIDE RAILS AND BRACKETS

2.19.1 Check all guide rails for plumb and parallel within maximum deviation of 1.6 mm correct to comply.

2.19.2 Tighten any loose rail brackets or rail clips.

2.19.3 Check the condition of all fastenings in hoistway.

2.19.4 Clean corrosion from portions of rails as required.

2.20 CAR DOORS

2.20.1 Provide new horizontal type sliding doors faced with Avesta, Deco 8, 20 gage stainless steel. Wrap stainless steel around door. Do not use binder angles.

2.20.2 Provide two (2) steel pins, one at each end of each door panel extending from the door into the centre of the threshold grooves to prevent the door swinging into the hoistway, should the lower guides become dislodged.

2.21 HOISTWAY DOORS AND FRAMES

- 2.21.1 Retain existing hoistway doors and frames. Provide a separate price to electrostatically paint all painted hoistway doors in place. Colour choice and finish by Owner.
- 2.21.2 Provide new lower guides.
- 2.21.3 Adjust hoistway doors for smooth and quiet operation.
- 2.21.4 Securely fasten sight guards.

2.22 CAR DOOR HANGERS AND TRACKS

- 2.22.1 Include two-point suspension door hangers for each door panel using rollers with resilient sound absorbing wearing surfaces and replaceable hanger tracks. Use rollers no less than 83 mm in diameter.
- 2.22.2 Use sealed self-lubricating ball or roller bearings sealed to retain grease lubrication and wipers to maintain rollers and track in clean condition.
- 2.22.3 Absorb upthrust with adjustable eccentric rollers equipped with ball or roller bearings.
- 2.22.4 Provide cold drawn or cold rolled steel hanger tracks.
- 2.22.5 Design for replacement of gibs without removing door from hanger tracks.
- 2.22.6 Provide stops at each end of hanger tracks to prevent doors leaving tracks.

2.23 HOISTWAY DOOR HANGERS, TRACK AND CLOSING DEVICES

- 2.23.1 Provide new hall door hanger rollers and related hardware.
 - 2.21.2 Thoroughly clean hall door tracks.
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2.23.2 Provide new sill mounted spring type closing devices or heavy duty spirators on all hoistway doors.

2.23.3 Provide new interlock contacts.

2.24 CAR AND HOISTWAY DOOR OPERATOR

2.24.1 Provide a closed-loop, heavy duty car electric door operator to open and close the car and hoistway doors quietly and smoothly. Use G.A.L. MOVFR or approved equal to Consultant.

2.24.2 Provide minimum motor size of 1/4 HP.

2.24.3 Operate the car door and hoistway door simultaneously.

2.24.4 Provide electrical cushioning at each end of travel.

2.24.5 Provide a new gate switch for car door operated by a roller attached to the door panel.

2.25 DOOR PROTECTIVE DEVICES

2.25.1 Provide three-dimensional sensing 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.

2.25.2 Include no moving parts.

2.25.3 Include solid state electronic devices to provide long term reliable operation.

2.25.4 Upon failure of the device, shut the car down at the next available floor, with doors in the fully open position.

2.25.5 Provide totally silent operation.

2.25.6 Include visible diagnostics on the device to permit verification that the unit is functioning.

- 2.25.7 Install all components behind the door jamb, so as to provide a clear opening and present a clean architectural appearance.
- 2.25.8 Design the device to provide a zone of detection - minimum 75 mm in advance of the leading edge of each car door and arrange the operation as follows:
- 2.25.8.1 Trigger the protection system when any object is located in the entrance and cause the door to reopen without engaging the object.
 - 2.25.8.2 Permit the protection system to be triggered throughout the full travel of the doors.
 - 2.25.8.3 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.

2.26 TERMINAL STOPPING DEVICES

- 2.26.1 Provide an automatic stopping device, arranged to bring car to a stop at the terminal landings independent of the regular operating device in the car.
- 2.26.2 Provide final limit switches in the hoistway, operated by the car and arranged to stop the car and prevent normal operation, should it travel beyond the zone of the normal stopping device.
- 2.26.3 Dowel final limits to main rails.

2.27 FASCIAS AND TOEGUARDS

- 2.27.1 Refurbish existing fascia include a thorough cleaning. Check attachments and straighten metal sheets. Be responsible for the fascias from pit floor to underside of sill at top floor.
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- 2.27.2 Provide a final coat of paint on fascias.
- 2.27.3 Provide new 1220 mm toe guard painted with two coats of rust resistant enamel paint.

2.28 IDENTIFICATION

- 2.28.1 Provide 100 mm numerals corresponding to floor level on hoistway side to fascia plates and locate numerals as required by Code.
- 2.28.2 Provide all necessary engraving on faceplates as required by the Consultant in English and French, Helvetica medium, upper and lower case.
- 2.28.3 Install 50 mm stainless steel characters with braille on each side of frames for handicapped requirements.

2.29 CONTROLLER AND CABINET

- 2.29.1 Enclose controller in enamelled ventilated sheet metal cabinet with hinged doors for easy access conforming to CSA C22.2 .
 - 2.29.2 Provide direct current operated equipment.
 - 2.29.3 Provide properly sized primary and secondary fusing for transformers.
 - 2.29.4 Provide similar switch and relay units of same manufacturer and clearly identify controller components and terminal connections to agree with wiring diagrams.
 - 2.29.5 Include reverse and open phase protection.
 - 2.29.6 Use two (2) main line contactors to avoid possibility of continued operation of pump if one switch should fail.
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2.30 HALL BUTTON FIXTURES

- 2.30.1 Provide new illuminated vandal resistant stainless steel push buttons, with stainless steel faceplates.
- 2.30.2 Install no more than 1067 mm to top of button above floor level. Use existing boxes or provide all required cutting and patching. Surface mounted faceplates are acceptable.
- 2.30.3 Provide a fixture at each landing. Single at terminal - U-D at intermediate landings. Retain the functionality of existing keyed lockouts including new locks, keyed the same as the new COP lockouts.

2.31 POSITION INDICATORS

- 2.31.1 Include over top of main floor entrance and in the car cab a new position indicator.
- 2.31.2 Provide stainless steel faceplate sized to cover existing hole for the hall position indicator.
- 2.31.3 Provide vandal-resistant design - discrete floor indication illuminated by l.e.d. bulb.

2.32 CAR OPERATING STATION

- 2.32.1 Provide one (1) new car operating station per cab. Incorporate a service cabinet into car operating station. Service panel to be at top of car operating panel. Provide in the lockable service cabinet: key operated switches for lighting, fan, emergency light test and independent service. Provide one spare key switch.
 - 2.32.2 Use stainless steel, No. 4 satin finish cover.
 - 2.32.3 Engrave characters on plate and fill with enamel.
 - 2.32.4 Provide LED illuminated stainless steel floor buttons. Provide flush mounted tactile identification at side of button.
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- 2.32.5 Locate top floor button to be no more than 890 mm above floor.
- 2.32.6 Provide a key operated stop switch, an alarm button, door open and close buttons.
- 2.32.7 Engrave identification in upper or lower case, Helvetica medium, minimum 9 mm filled with red or black enamel, as required.
- 2.32.8 Engrave the maximum capacity in kilograms and persons and Provincial Installation number on the car station.
- 2.32.9 Engrave the elevator number on the car station, number to be 25 mm high.
- 2.32.10 Use international symbols wherever possible.

2.33 ACCESS TO PIT AND TOP OF CAR INSPECTION OPERATION

- 2.33.1 Provide access to pit and car top. Provide keyed access where required by code. Re-use of any existing keyed access station is acceptable where re-keyed.
 - 2.33.2 Provide drop key access at each landing. Include a stainless steel hole collar.
 - 2.33.3 Provide new car top inspection station. 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.
 - 2.33.4 When on top of car inspection operation:
 - 2.33.4.1 Prevent movement of car unless all electric door contacts are closed.
 - 2.33.4.2 Disable automatic levelling, power door operation and the normal car operating devices.
 - 2.33.4.3 Provide speed of elevator greater than 50 fpm but not more than 150 fpm.
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2.33.5 Paint an outline of the refuge space on the car top.

2.34 PIT WORK

2.34.1 Provide new spring buffers.

2.34.2 Provide new pit stop switches, positive acting and red in color.

2.34.3 Scrape all portion of rails and buffer stands of rust.

2.34.4 Provide a new pit light fixture per pit located diagonal from existing in order to maximize ambient lighting.

2.35 FIXTURE FASTENINGS

2.35.1 Fasten fixture faceplates, including car operating station, with tamper resistant fasteners.

2.36 WORK LIGHTS AND RECEPTACLES

2.36.1 Provide two (2) guarded light fixtures on car top and one (1) duplex GFCI 110 volt receptacle on car top.

2.37 BILINGUAL MARKINGS

2.37.1 Engrave identification and instructions on operating panels and on all signal equipment in both official languages except where design is such that inference is obvious and readily understood. Submit markings and designs for approval.

2.38 KEYS

2.38.1 When keys are turned over to the Owner, they shall be properly identified for all forms of operation. Six (6) keys of each type to be provided.

2.38.2 Provide key rings and engraved gravoply discs, identifying use of key.

2.39 JACKS

- 2.39.1 Provide new twin-post hydraulic system.
- 2.39.2 Construct piston of selected steel tubing machined true and finished to surface finish of 0.0008 mm roughness height rating or better. Telescopic plungers are not acceptable.
- 2.39.3 At top of cylinder include stuffing box and packing gland with seal or self-adjusting packing which does not require external adjustment.
- 2.39.4 Design and install cylinder and plunger plumb. Operate with minimum friction.

2.40 PHASE I AND II FIREFIGHTERS EMERGENCY OPERATION

- 2.40.1 Provide emergency recall service which will be initiated automatically or manually by any recall switch. When recall has been initiated:
 - 2.40.1.1 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.
 - 2.40.1.2 The elevator that is stopped with the doors closed, or is travelling towards the recall level, shall proceed non-stop to the recall level.
 - 2.40.1.3 The elevator travelling away from the recall level shall reverse at or before the next available landing without opening its doors.
 - 2.40.1.4 A car stopped at a landing shall have its emergency stop switch rendered inoperative as soon as the doors are closed and the car starts to move. A moving car
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shall have its emergency stop switch rendered inoperative.

2.40.1.5 All call registered lights and directional lanterns shall be extinguished and remain inoperative. Position indicators, in the car and at the recall level, should remain in service.

2.40.1.6 The car shall be provided with a visual and audible signal system which shall be activated to alert passengers that the car is on the emergency recall operation and at least the visual signal shall remain operative until the car reaches the recall level.

2.40.1.7 An elevator stopped at a floor other than the recall level with doors open shall close its doors and proceed non-stop to the recall level.

2.40.1.8 Door re-opening devices that may be affected by smoke or hot gases shall be rendered inoperative.

2.40.1.9 If the elevator is on inspection operation, a signal shall warn the inspector to return the car to the recall level. The elevator shall remain under the control of the inspector.

2.40.1.10 The recall operation shall be terminated when both switches at the main control panel and lobby panel are in the "RESET" or "OFF" position, as is appropriate.

2.40.1.11 Include for connecting the fire alarm signal through the recall switch.

2.40.2 Provide in-car emergency service for each elevator initiated by a key switch located in the car. 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. During emergency in-car operation, the elevator shall operate as follows:

- 2.40.2.1 The elevator shall be operable only by a person in the elevator.
- 2.40.2.2 The elevator shall not respond to elevator landing calls.
- 2.40.2.3 The opening of power-operated doors shall be controlled only by continuous pressure on the "DOOR OPEN" button. If the "DOOR OPEN" button is released during the "OPEN" motion, the door shall reclose immediately. When doors are fully open, they shall remain open until closed as in point 5.
- 2.40.2.4 Door re-opening devices for power-operated doors shall be rendered inoperative.
- 2.40.2.5 The doors shall be closed and the car started by registering a car call and constant pressure on the "DOOR CLOSE" button or on any car call button.
- 2.40.2.6 Momentary operation of the in-car emergency service switch to the "HOLD" position shall cancel registered car calls.
- 2.40.2.7 When the car is at a landing and the key switch in the car is turned to the "HOLD" position, the doors shall remain open and car calls cannot be registered.
- 2.40.2.8 When the car is at a landing and the key switch in the car is turned to the "OFF" position, the car shall automatically return to the recall level as on emergency recall operation regardless of the position of the emergency recall switch.
- 2.40.2.9 The elevator shall be returned from In-car operation only when the car is at the recall level and the in-car switch is in the "OFF" position.
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3 PART III EXECUTION

3.1 REMOVAL OF OLD EQUIPMENT AND DRILLING

- 3.1.1 Remove and dispose of all redundant elevator equipment from the site. Engage a licensed handler of hazardous materials to remove and dispose of power unit oil.

3.2 ARRANGEMENT OF EQUIPMENT

- 3.2.1 Arrange equipment in machine room so that equipment can be removed for repairs or replacement without dismantling or removing other equipment components.
- 3.2.2 Arrange equipment for clear passage to machine room door.
- 3.2.3 Accommodate equipment in existing spaces including machine room, pit, overhead and hoistway width and depth.

3.3 WELDING

- 3.3.1 Where welding is used for cylinder and pressure piping, prepare joints and weld in approved manner using welders fully qualified.
- 3.3.2 Identify field welds with welder's identification stamp.

3.4 BURNING TORCHES

- 3.4.1 Provide on site at all times a fire extinguisher, particularly when utilizing burning torches for removal of existing cylinder.

3.5 PROTECTION

- 3.5.1 Provide protective coverings for finished surfaces.
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3.6 FINISHING AND PAINTING

- 3.6.1 Upon completion, touch up and restore to new conditions all factory finished surfaces where damaged or defaced.
- 3.6.2 Remove protective coverings and clean exposed surfaces after completion and leave in first-class condition.
- 3.6.3 Paint all equipment in pump room, including floor. Use One coat enamel CGSB 1-GP-66M reduced by addition of 1 part CGSB 1-GP-70M thinner to eight parts enamel and one coat enamel CGSB 1-GP-66M.
- 3.6.4 Paint the following equipment in the hoistway: All pit equipment including floor, car tops with crossheads, strut angles and fascia plates.
- 3.6.5 Paint all other elements of the hoistway, pit, car, counterweight and car underside exposed to public view and considering the open hoistway and glass cab. Include painting of back of doors and entrances, fascia, rails and rail attachments. Use two coats of enamel to Architect's choice of colour.
- 3.6.6 Provide aesthetically pleasing finishes free of rust, bare metal and hand-written characters.

3.7 HOISTWAY PROJECTIONS

- 3.7.1 Provide any bevelling for projections or recesses in hoistway to code requirements.

3.8 PERFORMANCE

- 3.8.1 Provide smooth acceleration and deceleration of car without perceptible steps so adjusted as not to cause passenger discomfort.
 - 3.8.2 Provide elapsed time required to travel a typical floor not to exceed 15.0 seconds, measured when the fully-opened doors start to close until the car is level with the next floor and the car and hall doors are
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open to three-quarters of the fully- open position. The above time shall be measured with full load in the car in both directions of travel. For other conditions of loading the time shall not vary more than 10%.

- 3.8.3 Open car and hoistway doors in approximately 2.5 seconds and close in approximately 3.5 seconds.
- 3.8.4 With the control adjusted to give the required time, provide smooth acceleration and deceleration and provide a comfortable and agreeable ride to the passengers.
- 3.8.5 Maintain floor levelling accuracy of 9 mm or better.
- 3.8.6 Provide adjustable dwell times, independent settings for car and hall. Set the dwell times to 6 seconds for car, and 8 seconds for hall initially.
- 3.8.7 Adjust acceleration rate to 0.05 g.
- 3.8.8 Adjust vibration in X and Y axis to 0.03 g.
- 3.8.9 Adjust jerk rate (change in rate of acceleration) not to exceed 10 f/s/s/s.
- 3.8.10 Achieve performance standards with dependable, consistent operation without undue wear or excessive maintenance over the life of the elevator installation.

3.9 FIELD QUALITY CONTROL

- 3.9.1 Perform and meet tests required by ASME A17.1-2007/CSA-B44-07 Safety Code. Furnish test and approval certificates issued by appropriate authorities.
 - 3.9.2 Supply instruments and carry out additional tests specified herein.
 - 3.9.3 Provide 2 days written notice to Consultant of date and time of tests.
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- 3.9.4 Have a copy of the Specifications on site and available to the Mechanic.
- 3.9.5 Test stop ring and hydraulic system by operating elevator with rated load in UP direction against stop ring at inspection speed.
- 3.9.6 Provide to Consultant a copy of all speeds, current readings and pressure readings taken at the time of Provincial inspection.

3.10 ELEVATOR CONSULTANT

- 3.10.1 Consultant has general supervision and direction of the elevator work. He may be authorized by the Owner to stop the work whenever the stoppage is necessary to ensure the proper execution of the contract.
- 3.10.2 Furnish competent and co-operative mechanics for inspections and acceptance tests as the Consultant requires. Expect to have work interrupted during progress inspections by the Consultant.
- 3.10.3 Consultant will carry out one (1) Final Inspection and one (1) Re-inspection. Other inspections required due to the Elevator Contractor's failure to completely correct deficiencies previously listed may be deducted from the contract value by the Owner.
- 3.10.4 Complete deficiencies identified by Consultant promptly. Complete deficiencies identified on Consultant's final inspection report within 30 days of receipt, or alternatively provide written notice of any disputed items within 10 days of receipt. Pre-agreed compensation to the Owner shall be the extension by the same period completion of deficiencies is delayed beyond 30 days.

3.11 NOTIFICATION TO CONSULTANT

Notify the Consultant at the following project milestones.

- 3.11.1 Two weeks prior to commencement of work.
 - 3.11.2 When new pumping unit is operational.
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3.11.3 On completion of car buttons and door operator.

3.11.4 On booking of Regulating Authority inspection.

3.11.5 On completion of any deficiencies.

3.12 COMMISSIONING AND DEMONSTRATION OF OPERATION TO CONSULTANT

3.12.1 In the presence of the Consultant and Owner demonstrate: Independent Service Operation, Battery Lowering Operation and the operation of any other devices necessary for the operation of the elevator, by the Building Personnel.

3.12.2 Designate one staff person as Contractor's commissioning manager for the project. Manager to be of Adjuster, Supervisor or Manager level or higher.

3.12.3 Attend at job site meetings pertaining to the Work.

3.12.4 After Provincial inspection of each elevator and before turn-over for customer use, test elevators in simulated automatic operation without passenger access.

.1 Test for four (4) consecutive hours with 100% load operating from floor to floor, with or without door operation.

.2 Test for four (4) consecutive hours operating from floor to floor with door operation. Provide barricades and signage to indicate that an elevator test is in progress.

3.12.5 Before turn-over for customer use, test elevators as following:

.1 Working pressure in up direction with 100% car load.

.2 Door timings and dwell settings.

.3 Operating speed, full load, up.

.4 Operating speed, empty car, down.

- .5 Door close force.
- .6 Door detector interrupt setting.
- .7 Relief pressure setting.

3.12.6 During warranty maintenance period closely monitor equipment for malfunctions and track reliability. Achieving a reliability rate of less than 0.6 malfunctions per elevator per month during the three month period preceding the expiration of the warranty maintenance period.

Table 1- Commissioning Data to Be Submitted by Contractor

PARAMETER	Elev. 1
Car speed UP (fpm)	
Car speed DOWN (fpm)	
Start to stop UP (sec)	
Start to stop DOWN (sec)	
Operating pressure UP (psi)	
Relief Pressure (psi)	
Door open (sec)	
Door close (sec)	
Car call dwell (sec)	
Hall call dwell (sec)	
Door stall force (pounds)	
Door timeout (sec)	

- end of section -

1.1 SCOPE OF WORK

The work described herein includes for all labour and material, including all overtime required to meet the Project Schedule, to provide a non-proprietary elevator monitoring system to monitor and control the new/modernized elevators of this project. Work shall include but not be limited to.

- .1 Controller interface with all necessary input/output devices.
- .2 Provide a master monitoring display within the elevator controller or alternatively at a PC mounted adjacent to the elevator controller.
- .3 Provide addressable device so that the master station can be monitored remotely by Internet Protocol. This function will allow monitoring and report functions but not control functions. Supply Windows 8 based Ultra book computer fully loaded with required software to connect to elevator monitoring screen over any internet connection, either by web site or through software resident on the remote computer.
- .4 Provide paging function using e-mails sent by system to programmable e-mail addresses for various events.
- .5 All interconnecting wiring between elevator controllers in accordance with monitoring system manufacturer's requirements.
- .6 All network engineering including system final testing and client training by monitoring system's technical personnel.
- .7 Initial job survey of two days and training of PWGSC staff of an additional three days by monitoring system's technical personnel. This is a brief description only; complete details are outlined in the specifications.

1.2 RELATED WORK TO BE PERFORMED BY ELEVATOR CONTRACTOR

- .1 Provide all inter-connecting wiring.
- .2 Provide data jacks in the machine rooms as required.

1.3 CONTROLLER PROVISIONS

- .1 Provide a monitoring system interface per controller or elevator group to provide the required input/output devices.
- .2 The elevator controller interface shall provide a terminal strip connected to dry contacts representing the following:
 - .1 Operation normal
 - .2 Fire Service Main
 - .3 Fire Service Alternate
 - .4 Fire Service Phase 2
 - .5 Main Power Lost

- .6 Running on Emergency Power
 - .7 Fault - shut down
 - .8 Inspection
 - .9 Independent service
 - .10 Governor
 - .11 Up direction indication
 - .12 Down direction indication
 - .13 One contact for each position in the hoist way (PI)
 - .14 Front Door Open
 - .15 Front Door Closed
 - .16 Rear Door Open (where available)
 - .17 Rear Door Closed (where available)
 - .18 One contact for each car call (On when registered)
 - .19 One contact for each hall call (On when registered) (note, most floors will have both UP and Down call capability)
- .3 The following inputs shall be available on a terminal strip provided by the contractor, which will allow the monitoring system to control the operation remotely. They shall be operated by closing a dry contact. The terminal strip may provide either a single common point for all inputs or separate common points as required for various inputs.
- a. One contact to register each car call remotely
 - b. One contact to register each available hall call remotely
 - c. One contact to secure each car call
 - d. One contact to secure each hall call button.
- .4 Provide a labelled interface system junction box on the outside of the controller with all wiring be identified as such. Terminate cables in the junction box on terminal strip, clearly identify all contacts for monitoring system use.
- .5 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 lamicoïd or metal tag mounted immediately adjacent to the component.
- .6 The Junction box shall be an enamelled, ventilated, sheet steel cabinet, with swing-type lockable doors at front.
- .7 The Contractor shall be responsible for coordinating the installation of the monitoring system as well as coordinating the interfacing and connection requirements to ensure a workable system.
- 1.4 MONITORING SYSTEM GENERAL REQUIREMENTS**
- .1 The monitoring system shall be an interactive Microsoft Windows based software system that runs on an IBM compatible Personal Computer (PC). Software includes a "un-install" utility and is certified 100% Windows compatible. Software installation includes:

1.5 MONITORING AND
DIAGNOSTIC CONTROL
SYSTEM

- .2 Provide all documentation, manuals, system set-up & start-up. Include training as specified.
- .3 While connected to the elevator system, the Elevator Management Control System downloads and collects available data, which is organized in a database. This software provides easy-to-use pull-down menus, using the Microsoft Windows based operating system, allowing the user to monitor and review the elevator performance database in different formats.
- .4 Provide all software licenses to a minimum of 10 years.
- .1 Modify existing elevator control systems system for monitoring, diagnostics and control. Equip controllers with necessary interface software logic program to monitor elevator functions and record events to storage.
- .2 Use menu driven system with password protection. Connect all wiring to terminal blocks mounted on the panel
- .3 The system will be capable of displaying reports by keyboard entries including all statistics of the preceding one-hundred eighty (180) days, as a minimum. All car and hall register times and all fault reports are to be displayed. Provide a means, and any software required, to copy this data to an output file.
- .4 Supply and run all necessary interconnecting wiring between elevator controllers. Tape and legibly identify all wires and terminal boxes.

1.6 EVENT DISPLAY AND
RECORDING

- .1 Provide computers, loaded with licensed software, with the following capabilities.
- .2 Real-time display screens.
- .3 Online Help to provide a complete content-sensitive help program shall be provided to give the users hints and explanations of the current task.
- .4 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.
- .5 Individual Flags - This screen shall display a list of the selected elevator's internally generated computer flags for diagnostics.
- .6 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
 - a. Individual Elevator Position
 - b. Individual Elevator Car Calls

- c. Individual Elevator Direction
 - d. Individual Elevator Door Position
 - e. Individual Elevator Status of Operation (Emergency
 - f. Recall, Emergency Power, Independent Service etc.)
 - g. Individual Elevator Communication Status
 - h. Registered Up and Down Hall Calls
 - i. Controller Real-Time Clock Date and Time
- .7 Emergency Notification - in case of unit shutdown, the system shall have the ability to page designated personnel to notify them of an emergency event.
- .8 Reporting ability including malfunction events, Average Wait Time for elevators and total availability time for all units.
- .9 The system shall provide a multiple level of password protection for the usage of the system.
- .10 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.

1.7 ACCESS CONTROL

- .1 The system shall provide multiple levels of password protection for the usage of the system. All password selections are set up and maintained by the Owner.
- .2 The system provides access control, featuring comprehensive programming of the access level for the entire elevator call system. Each hall call, as well as each car call is individually programmable for access.
- .3 When using access control, every floor has its own unique access schedule which is completely independent of the access schedule for any other floor in the building. The program also allows the programming of many other functions such as groups of calls by floor, special events, holidays, levels of access and so forth.
- .4 Levels of Access Control
- a. Locked - Passengers in any elevator car serving a locked floor are not able to register car calls to that locked floor. Likewise, anyone in the elevator lobby on a locked floor is not able to register a hall call (up or down) to bring an elevator car to that locked floor. Any hall or car calls registered for a floor when it becomes locked is immediately canceled.
 - b. Unsecured - Passengers are able to access any unsecured floor from any car or hall call without restriction.
 - c. Secured - Only passengers with a proper passenger access code or floor access code are able to register a car call to a secured floor.
- .5 Hall Call Control
- a. Hall calls on each floor can be set to either locked or unsecured. If a

hall call for a particular floor, direction (up or down), side (front or rear) and for a particular hallway pushbutton riser (main or auxiliary) is set to locked, then no one is able to register that hall call. If a hall call is set to unsecured, that hall call is registered without restriction.

- .6 Car Call Control
 - a. Car calls can be set to one of three states: locked, secured, or unsecured. If a car call for a particular floor and a particular side (front or rear) is set to lock, then no one is able to register that car call.
 - b. If a car call is set to secure, then only passengers with a proper passenger access code or floor access code are able to register that car call. The system is capable of being programmed for either passenger access or floor access.
 - c. If a car call is set to unsecured, that car call is registered without restriction.
- .7 Access Control Resolution
 - a. At highest resolution, the user is able to control access on a per button basis. This means that every single call button in the system is programmable and has its own unique access schedule. The system also includes the flexibility to allow the user the option of combining or grouping calls together, which allows access control at a lower resolution and makes the job of programming and maintenance more manageable. Additionally, the user can combine every single car call and hall call in the system into a single combined call. When that combined call is locked, all calls in the whole system are locked. When that call is unsecured, all calls are accepted without restriction.
- .8 Access Control Programming
 - a. The access control programming feature allows the user to program the level of access to be in effect on specific days of the week, holidays, or other user defined days. As an example, a user may wish to lock certain floors on weekends and holidays, while other floors may be unsecured on weekends and locked only on certain holidays. The event program shall provide full flexibility to meet all of these needs. A user is able to program access for a one-time event or for events which occur on a weekly, bi-weekly, monthly, yearly, or other periodic basis. Furthermore, the user is able to program events days, months, even years in advance of the actual date. When the time of the event occurs, the event program automatically secures the building in the manner desired.
- .9 Car Station Card Access
 - a. The system provides car call access by using the card swipe station that is installed in the car operating panel. The access card allows authorized passengers to swipe their card and register their floor access. When the access system is activated, card access must be used to register calls to any floor that has been designated in the system as a secured floor.
- .10 Passenger Access Control
 - a. The passenger access security feature provides car call security for each elevator in the system to any secured floor on an individual passenger basis by using unique individual passenger access swipe card. The passenger

uses the card swipe available in each car to register the appropriate passenger access code required to go to a floor.

b. Each passenger has their own unique passenger access code, and may be authorized to have access to a single floor or many different floors by assigning an accessible floor number(s) in the individual's data file. Time restrictions may also be assigned to an individual passenger to restrict access during certain time periods.

c. The passenger code includes a passenger ID (name), unique personal access code (number), authorized floor destinations and authorized time window(s).

.11 Floor Access Control

a. The floor access security feature provides car call security for each elevator in the system to any secured floor on a per floor basis by using unique floor access codes.

b. The floor access code is a per floor access code giving every floor a different access code, or if desired, the system allows a single access code to be assigned to more than one floor.

c. Any passenger authorized to have a floor access code is permitted to register a car call for that floor. The passenger uses the car call buttons in each car to register the appropriate floor access code. All passengers going to that floor(s) use the floor access code assigned to a floor.

.12 User Interface:

a. The user may have limited system access through a machine room CRT terminal or any remote extension of the machine room CRT terminal. The user may be able to fully access the system through an IBM compatible computer(s) running the monitoring software program.

b. The building manager or other authorized personnel with the appropriate system security password is able to program the system, view building access configurations (past, current and future), print reports and so forth.

.13 Report Generation:

a. A list of passengers who registered secured car calls is available on the CRT and is sorted by time and date. The system stores all events associated with the use of any individual passenger access code. Reports are generated by computers running the monitoring software.

b. Users with monitoring software are able to select and sort the list of car calls to secured floors by date, time, source floor, destination floor, car number, and passenger ID.

c. The user interface lets the user see and print a report listing the time and date at which individual passengers accessed secured floors.

.14 Software Switch:

a. The software switch is a logical switch accessed through a computer running monitoring software or from a machine room CRT. When the software switch is on, the building elevator access system is activated and when off, the system will be deactivated.

.15 Special Operations:

a. The access system is overridden in case of fire service operation. In

the case of independent service and other special operations, as an option the system may or may not be overridden.

1.8 ARRANGEMENT OF EQUIPMENT

- .1 Arrange equipment in machine room for clear passage to machine room door.
- .2 Do not locate monitoring PC's near hoist motors, transformers or any sources of high EMF.

1.9 REMOTE ACCESS

- .1 All required functions of the controller/machine room mounted system will be available remotely by internet protocol with appropriate password and login.
- .2 Include Ultra book (tablet/laptop combination) operating Windows 8 Pro configured for the remote monitoring with 10.6" screen, 4 GB RAM, 126 GB hard drive and Intel i5 processor.

1.10 FACTORY
REPRESENTATION

- .1 Provide the services of a technical factory representative to perform the initial project survey including a minimum of eight (8) hours on site.
- .2 Provide the services of a technical factory representative trained in presentation skills to perform training for PWGSC. Include a minimum of sixteen (16) hours on site.
- .3 Provide when requested by the Departmental Representative a hard copy of a condensed version of the elevator monitoring operational features.
- .4 The Elevator Contractor is to provide all information to the Departmental Representative that is required for the safe and efficient maintenance of the elevator equipment, including any solid state equipment or devices supplied under these specifications. The supplier is not to refuse any information, or the supply of parts, at fair market value, that is required by the Owner's Maintenance Contractor.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.