

Radiation Protection Bureau
775 Brookfield Road
Ottawa, Ontario

specifications
elevator

Elevator Modernization

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Section 14200 General

1 General

1.1 Scope

- .1 Provide labour, materials, products and services necessary for the following work at Radiation Protection Bureau, 775 Brookfield Road, Ottawa, Ontario:
 - .1 The modernization of one group of two buried hydraulic passenger elevators designated 1 and 2, in accordance with Section 14210.
 - .2 The decommissioning of a single winding drum freight elevator, in accordance with Section 14220.
 - .3 Act as the General Contractor for the scope of work detailed herein and provide a foreman or site supervisor on-site at all times during construction work.

1.2 DSS Documents

- .1 Refer to the DSS documents (attached as Appendix A).

1.3 Maintenance service under this contract

- .1 Provide full maintenance service for the equipment starting from the date of work on site until one year after Substantial Performance.
- .2 This maintenance includes systematic examination, cleaning, lubricating and adjustment of all elevator equipment.
- .3 All inspections and tests are to be carried out in accordance with the CSA Standard B44.2-10 and Elevating Devices Code Adoption Document 277-19.
- .4 Regular examinations are to be carried out (callbacks do not constitute an examination). Minimum frequency - monthly, which are to be scheduled in advance with the Departmental Representative.
- .5 Repair or replace electrical and mechanical parts of the equipment whenever required using only genuine standard parts produced by the manufacturer of the equipment concerned.
- .6 Perform work by licenced personnel experienced in this type of project work under supervision and in direct employ of elevator manufacturer, or manufacturer's licensed agent.

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- .7 Schedule work during regular trade working hours, with the Departmental Representative.
- .8 Include 24 hour call-back service due to equipment stoppage or malfunction at all times at no additional cost.
- .9 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.
- .10 Garbage shall be removed at each examination.
- .11 Adjust control system for optimum operation towards the end of the maintenance period.
- .12 Dress maintenance technicians in uniforms, register with designated personnel.
- .13 A licenced elevator mechanic with experience in maintaining these types of equipment shall maintain these devices.
- .14 Complete and maintain the PWGSC supplied log book, record all callbacks and repairs, as work is carried out. Provide an "acknowledgment of inspection" form at each inspection.

1.4 Maintenance Control Program

- .1 Provide to the Departmental Representative a copy of the Maintenance Control Program for each device type.
- .2 During the course of the maintenance contract update the Maintenance Control Program as necessary and forward to the Departmental Representative a copy of the updated Maintenance Control Program.
- .3 The Maintenance Control Program is the property of the Departmental Representative.
- .4 Store the Maintenance Control Program on site in accordance with the requirements of the Code.
- .5 Execute the maintenance in accordance with these specifications and the Maintenance Control Program.
- .6 As a minimum, perform tasks as required by the Code at the appropriate intervals.

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- .7 Where maintenance and testing frequencies in the Maintenance Control Program are less than these specifications, these specifications take precedence.
- .8 The Departmental Representative, acting reasonably, may approve changes to these specifications provided that the minimum requirements of the Code are respected.
- .9 Six months in advance of performing any tests that may result in damage to the building or equipment, submit to the Departmental Representative a written plan outlining:
 - .1 Step-by-step instructions of how the testing will be performed;
 - .2 Names and resumes of qualified personnel selected to perform the testing;
 - .3 Incremental testing procedures;
 - .4 Alternative testing means;
 - .5 Schedules.
- .10 If testing is performed prior to submitting an adequate plan and receiving approval from the Departmental Representative, the Elevator Contractor is responsible for correcting damage that may result from the testing.
- .11 In the event that the plan submitted is unsatisfactory to the Departmental Representative, the Departmental Representative may elect to use another Elevator Contractor to perform the testing.
- .12 Where the maintaining Elevator Contractor is the original equipment manufacturer, installer and has maintained the equipment since installation, the maintaining Elevator Contractor is responsible for correcting damage that may result from the testing.
- .13 Where damage results as a consequence of the testing the Departmental Representative may elect to have an inspection by others for the purpose of determining fault and corrective steps.
- .14 Where the Departmental Representative determines that damage is the result of maintenance deficiencies or improper testing procedures, the Elevator Contractor is responsible for correcting damage.

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1.5 Definitions of terms

- .1 The term "Owner", as used herein, refers to Health Canada.
- .2 The term "Inspecting Authorities", as used herein, refers to authorized agents of governments and of insurance groups that are charged with the responsibility of carrying out periodic inspections and tests on vertical transportation equipment.
- .3 The term "Consultant", as used herein, means KJA Consultants Inc. or such other entity selected by the Owner to fulfill the role of Consultant.
- .4 The term "provide", as used herein, means to supply and install new equipment.
- .5 The term "arrange", as used herein, means to provide the required features.
- .6 The term "unit", as used herein, means any Elevator, Escalator, Dumbwaiter, Moving Walk, Material Lift or similar device mentioned in this Specification.
- .7 The term "Code", as used herein, refers to the latest adopted edition of the CAN/CSA-B44 Safety Code for Elevators and Escalators with updates and including Nonmandatory Appendices (which are deemed mandatory herein).
- .8 The terms in the Specifications that are not otherwise defined shall have the definitions as given in the Code.

1.6 Operation and maintenance manual

- .1 Supply to the Consultant and Owner prior to the Substantial Performance inspection, operation and maintenance manuals.
- .2 The project shall not be deemed to have reached Substantial Performance until the complete operation and maintenance manuals have been approved by the Consultant or Owner.
- .3 Upon acceptance by the Consultant or Owner, provide three copies of the operation and maintenance manuals per group in one of the following formats, as selected by the Owner.
 - .1 Print and bind hard copies of which two will be given to the Owner and one will be placed in the respective machine room; OR
 - .2 Provide an electronic copy in PDF format on an unprotected digital storage device (such as a USB).
- .4 The operation and maintenance manual shall incorporate, at a minimum:

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- .1 A cover page including project title, address;
- .2 An index;
- .3 Contact details for the respective parties;
- .4 A warranty letter signed by a representative of the contractor having authority to bind the company;
- .5 Controller and drive manuals, including:
 - .1 A description of the controller user interface;
 - .2 The installation and user's manuals;
 - .3 A list of fault and error codes, including an explanation of meanings and corrective actions;
 - .4 Troubleshooting and diagnostic procedures, methods of use and the adjustment of programmable parameters together with their settings at the time of final adjustment.
- .6 As-built wiring diagrams;
- .7 The operation of the equipment including special features, dispatching sequences, and such items as intercom systems and security systems;
- .8 Step-by-step instructions for the operation for special features such as Firefighters' Emergency Operation, Independent service and Emergency Power service;
- .9 As-built diagrams and drawings of operating panels (e.g. car panels, central control consoles) with descriptions of the function of switches and indicators;
- .10 A copy of the final submission to the Authority Having Jurisdiction;
- .11 A copy of the final inspection report from the Authority Having Jurisdiction;
- .12 Operation and maintenance manuals for other major components where applicable, including:
 - .1 Door operator;

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- .2 Emergency brake;
- .3 Communication system;
- .4 Safeties & governor;
- .5 Hoist machine & motor;
- .6 Cylinders;
- .7 Hydraulic pump machine and internal components.
- .13 Supplier and part name for other parts (ex: travelling cable, restrictors, retainers, interlocks, car top inspection station, guide means, etc.), excluding minor or generic items such as screws, bolts, hinges, etc;
- .14 Full instructions for any special maintenance procedure, repair protocol, adjustment or test not addressed by Code (including the A17.2 and the Elevator Industry Field Employee's Safety Handbook);
- .15 Manufacturer's recommended maintenance intervals for each major component.
- .16 A copy of the Maintenance Control Program.

1.7 Coordination with other trades

- .1 Where the work joins another trade, provide drawings showing the actual dimensions and the method of joining the work to the work of the other trade and information such as anchors, templates and details for cast-ins.
- .2 Provide access and assistance as required, at no extra charge, in relation to work by other trades.

1.8 Fixture type

- .1 Provide, unless otherwise indicated in the Specifications or Drawings, signal fixtures as manufactured by Dupar, MAD or approved equivalent.
- .2 Provide push buttons with metal targets.
- .3 Provide, unless otherwise indicated in the Specifications or Drawings, signal fixtures in an illumination colour selected by the Owner.
- .4 Submit illustrations of those types available and provide at least one physical

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button sample of the type selected by the Owner for final approval.

1.9 Finishes: stainless steel

- .1 Provide, unless otherwise indicated in the Specifications or Drawings, stainless steel number four finish for visible natural metal finishes.
- .2 Arrange, unless otherwise indicated in the Specifications or Drawings, that the brush or grain direction of finishes of visible natural metals be in the vertical direction (for horizontal sections the brush or grain shall be in the direction of the longer surface dimension).

1.10 Progress payments

- .1 Progress payments will be based on the following schedule:

Description of Item	%
Contract award	10
Engineering drawing review	15
Material delivery to site	20
Progress (15% per elevator)	45
Provision of documentation & deficiencies resolution	10

- .2 A 10% holdback will apply to payments, this holdback to be released within one year of completion of the work described in these specifications.

1.11 Acceleration of the Work

- .1 If the Work falls behind the schedule, take action as necessary to meet the schedule, including, but not limited to, extra personnel and overtime work.
- .2 Pay any costs associated with this action unless the delay is caused by acts of government, riot, civil commotion, war, malicious mischief, act of God or any cause beyond the control of the contractor.

1.12 Access for cab refurbishing

- .1 The Owner will arrange for access to the elevators for cab refurbishing work, at a floor selected by the Owner.
- .2 The selected floor will not be the main floor.
- .3 It will be necessary to allow passage through the elevator lobby at the selected

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floor at all times; the corridor cannot be completely obstructed.

1.13 Acknowledgments

- .1 The proposer acknowledges that the proposer has found no discrepancies nor any ambiguities in the specifications.

1.14 Assignments

- .1 Do not assign nor sublet the contract without the written consent of the Owner.
- .2 Do not assign any payment due or to become due as a result of this contract without the written consent of the Owner.

1.15 Bilingual markings and announcements

- .1 Provide text of signage and markings visible to the public in both English and French.
- .2 Provide verbal announcements in English followed by French.

1.16 Certificates of inspection

- .1 Obtain and pay for certificates of approval and all other necessary permits and inspections.
- .2 Prior to Substantial Performance, arrange for a safety inspection of the equipment by the Owner's appointed qualified representative.
- .3 As a minimum, ensure that this inspection includes:
 - .1 Full load overspeed car safety tests if car safeties are provided;
 - .2 Empty car overspeed counterweight safety tests if counterweight safeties are provided;
 - .3 Pressure tests for hydraulic elevators;
 - .4 Full load full speed car buffer tests if oil buffers are provided;
 - .5 Empty car full speed counterweight buffer tests if counterweight oil buffers are provided;
 - .6 Full load full speed down direction brake tests if a traction machine is provided;

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- .7 Electrical safety circuit check;
- .8 Door pressure tests;
- .9 Tests of any other safety devices.
- .4 Submit, prior to Substantial Performance inspection, the approved safety inspection report.
- .5 Should more than one inspection for a licence or approval be required due to deficient work by others give sufficient advance notice of such deficient work to allow the Work to be completed prior to the time of the subsequent inspection.
- .6 If sufficient advance notice of such deficient work has not been given, assume the cost of the additional inspections.

1.17 Changes in Work

- .1 The Owner, without invalidating the contract, may order extra work or make changes by altering, adding to, or deducting from the Work, the contract sum being adjusted as agreed.
- .2 Execute all such work under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.
- .3 The Consultant shall have authority to make minor changes in the Work, not involving extra cost and not inconsistent with the purpose of the contract.
- .4 Otherwise do no extra work nor make any change unless in pursuance of written order from the Owner.

1.18 Claims for extra cost

- .1 Provide any claims for extra cost due to instructions or otherwise, to the Owner in writing within a reasonable time after the instructions and in any event before proceeding with the work.
- .2 No such claim shall be valid unless so made and authorized in writing by the Owner.

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1.19 Codes and ordinances

- .1 Supply equipment and do work in accordance with building codes, by-laws, regulations and requirements of the local, provincial and federal authorities in effect at the time of the execution of the work.
- .2 Supply equipment and do work in accordance with the Code, and any other code which may govern the requirements of the installation.
- .3 Provide labour and material, whether or not specifically mentioned in this specification, that may be necessary to provide an installation conforming to the applicable codes and regulations.
- .4 Comply with the requirements of the Occupational Health and Safety Act and Workplace Hazardous Materials Information System (WHMIS) regarding employee safety, use, handling, storage and disposal of hazardous materials.
- .5 Prior to submission of the proposal and throughout the duration of work, give prompt notification in writing of any regulations or requirements known to be in process which might affect the acceptability of the work.
- .6 If changes in codes or regulations result in extra costs, those taking effect subsequent to the date of proposal submission shall be treated as an extra to the contract.

1.20 Completion schedule

- .1 Submit with the proposal, a detailed schedule including specific dates for equipment delivery times, start of site work, completion of each unit and resolution of all noted deficiencies.
- .2 During the modernization period give the following information to the Consultant:
 - .1 Revisions, if necessary, to the completion schedule;
 - .2 A progress report every month showing the progress being made and the percentage of the job completed;
 - .3 Two weeks advance notice for inspection by the Consultant.
- .3 Schedule a job site meeting with the Owner every two weeks during the modernization period.
- .4 Schedule the work in such a way that no more than one elevator of the group is removed from regular service at any time.

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1.21 Contract Documents

- .1 The Contract Documents shall consist of general conditions, instructions to bidders, the Drawings, Specifications (including alternates and addenda) and completion schedules.
- .2 Execute the work in accordance with the Owner's contract documents, any supplemental conditions and these specifications.
- .3 Where there is a conflict between the documents the Owner's contract documents will take precedence over the other documents and any supplemental conditions will take precedence over these specifications.

1.22 Defective work and non-performance

- .1 The Owner reserves the right to correct any defective work and to charge the cost to the contractor.
- .2 Should the contractor fail to execute any of the Work set out in the contract the Owner reserves the right to do the Work and to charge the cost to the contractor.
- .3 The Owner reserves the right to withhold payment in the event of non-performance or to pay only for that portion of the Work that has been executed.
- .4 The Owner will give reasonable notice in writing prior to taking such action unless the defective work or non-performance prejudice the safety of people or the installation.

1.23 Drawing and sample submittals

- .1 Drawing and sample submittals are required for exposed finishes and fixtures.
- .2 Submit for review samples of metals, glass, paint colours, plastic laminates and finishes, of 200 mm (8") by 300 mm (12") approximate size, properly identified as to project, location and material.
- .3 Submit for review, as a minimum, the following:
 - .1 General arrangements;
 - .2 Details of areas where the work joins the work of other trades;
 - .3 Machine room layouts showing the location of the equipment;

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- .4 Hoistway layouts showing the location of the equipment, car platform dimensions, cab interior dimensions and net inside cab area;
 - .5 Hoistway sections showing overhead, pit equipment, car and frame and entrances;
 - .6 Cab details including the cab shell, platform, interior panels, ceiling, entrance, lighting and finishes;
 - .7 Details of control panels such as central control consoles or fire control panels showing the layout and detailing the design of switches and indicator lights;
 - .8 Details of intercom system station types detailing the controls;
 - .9 Details of any display devices complete with examples of proposed displays, symbols and layout;
 - .10 Fixture brochures.
- .4 Show on the general arrangement or separately, details of frames, doors, sills and supports, lanterns and gongs, including views showing the relationship of hall stations, lanterns and entrances.
 - .5 Provide as built information at job completion prior to Substantial Performance.
 - .6 Reviews do not include the checking of measurements and do not imply approval of variations from the specifications.

1.24 Electrical diagrams

- .1 Supply wiring diagrams and data as required for the execution of the Work including schematics for speed control, dispatching system, interfaces, printed circuit boards.
- .2 Incorporate, as part of the schematic diagrams, a reference index ('road map') giving the location of electrical components and wiring interconnections for relay coils, relay contacts, field equipment, integrated circuits and other such devices, so that the position on the schematics of any of these items can be readily determined.
- .3 Supply, prior to the Substantial Performance inspection, three prints and one reproducible of the wiring and schematic diagrams revised to show changes that have been made.

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- .4 Supply, prior to the Substantial Performance inspection, a set of plastic coated schematics mounted on a rack in the machine room so arranged that each sheet is readily accessible for trouble-shooting purposes, revised to show changes that have been made.
- .5 Supply, prior to the Substantial Performance inspection, a PDF copy of the wiring and schematic diagrams revised to show changes that have been made.
- .6 If changes are subsequently made to the wiring or control, supply an additional two sets of marked-up prints, a marked-up set of plastic coated schematics mounted on a rack in the machine room and an additional PDF copy of marked-up prints of the schematics and field wiring diagrams showing the changes.

1.25 Environmental considerations

- .1 Where practicable, recycle material replaced in the course of the work.
- .2 Provide a list of materials to be removed from site and their proposed recycling or disposal location for approval prior to commencing work.
- .3 Where practicable, provide new materials manufactured by methods that do not adversely affect the environment by, for example, generating residual deposits of heavy elements and greenhouse gases.
- .4 Use materials on site, such as low VOC (Volatile Organic Compound) adhesives and paint, that will not negatively affect the in-building environment.
- .5 Use only adhesives that comply with the requirements of SCAQMD Rule #1168.

1.26 Equipment insurance

- .1 The Owner's insurance policy covers equipment actually in place in the building and accepted by the Owner.
- .2 All other material and equipment is not included in the Owner's policy and such material and equipment is stored at the Contractor's own risk.

1.27 Equipment moving

- .1 Provide floor protection and bracing so that equipment moving causes no damage to the building.

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1.28 Existing conditions

- .1 Provide additional material and labour necessary to modify the equipment to suit the existing site conditions, in order to complete the Work and to obtain licences and approvals.

1.29 Existing drawings

- .1 The Owner will provide, if available, existing equipment layout drawings.

1.30 Existing equipment: refurbishing

- .1 Refurbish the retained existing equipment; cleaning, reworking or replacing worn parts, refinishing and adjusting so that the appearance and performance of the equipment are as new and so that the completed modernization is the equivalent of a new installation.

1.31 Failure to perform

- .1 If the contractor shall neglect to prosecute the work properly or fail to perform any provision of the contract, the Owner after ten days written notice to the contractor may, without prejudice to any other remedy the Owner may have, make good such deficiencies and may deduct the cost therefrom from payment due to the contractor.

1.32 Generic maintenance

- .1 Arrange that the equipment can be maintained and adjusted by any competent elevator company without the use of proprietary tools, information or equipment or, if such tools, information or equipment are required, provide them (these shall become the property of the Owner).
- .2 Do not incorporate any running time, cycle counters or trip counters that would cause the equipment to shut down or alter its operation in any way.

1.33 Group inspection by the Consultant

- .1 Advise the Consultant in writing two weeks prior to the completion of a group so as to arrange an inspection by the Consultant at a mutually convenient time.
- .2 Assist the Consultant in the performance of this inspection to verify that group programming and dispatching systems are in compliance with the Specifications.
- .3 Provide a team of competent persons to assist the Consultant in making the

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necessary tests and inspections.

1.34 Hoistway protection

- .1 Provide, maintain and, after the Work is complete, remove any partitions required in the hoistway.
- .2 Provide, maintain and, after the Work is complete, remove protective hoarding required at openings into the hoistway.
- .3 Submit the design and finish of the protective hoarding for review.

1.35 Inability to complete contract

- .1 Should there be a reasonable doubt that the work can be completed within the scheduled time because of labour disputes or any other cause, the Owner reserves the right, at the Owner's option, to cancel the contract.
- .2 In the event this option is exercised, the payments for the work shall be made on a pro rata basis for materials and labour supplied to the time of cancellation and such material and work performed shall become the property of the Owner.
- .3 Prior to exercising this option, the Owner shall give two weeks notice in writing of intention to cancel.

1.36 Information with proposal

- .1 Provide the following information, where relevant, with the proposal:
 - .1 The model and manufacturer of such items as solid state drives, fixtures, control systems, door operators and other purchased material (with the exception of miscellaneous minor items);
 - .2 The current rating of the solid state drives;
 - .3 The KVA rating of the transformers feeding the solid state drives;
 - .4 Certification from an independent testing laboratory detailing the line pollution generated by the solid state drives;
 - .5 Certification from an independent testing laboratory detailing the extent to which the control systems are protected against external electromagnetic radiation;
 - .6 Brochures, descriptions and manuals (where applicable) for the major

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items;

- .7 Renderings or samples of the fixtures and exposed materials;
- .8 Detailed completion schedule for the work;
- .9 A copy of your health and safety policy as issued to your employees;
- .10 Mechanic and team regular and overtime hourly rates.

1.37 Inspection and acceptance

- .1 When completed, carry out an inspection, witnessed by the Consultant, to see that the work is in compliance with the Specifications.
- .2 Furnish a team of competent personnel, for one working day per unit, to assist in making these inspections.
- .3 If the results of these inspections do not meet the requirements of the Specifications, make the appropriate corrections, and provide, as set out above, for another inspection.
- .4 Give sufficient advance notice in writing so that the Consultant can arrange for their representative to witness these inspections.

1.38 Key switches

- .1 Where key switches are specified supply switches and keys compatible with the vertical transportation equipment portfolio of the Owner, where possible, unless otherwise noted herein.
- .2 Provide 4000 series key switches.
- .3 Provide to the Owner, five copies of each key-switch key type defined in the Code as being Security Group 2, 3 and 4.
- .4 Provide keys with engraved labels and group the keys by Security Group and key type.

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1.39 Labour laws

- .1 Comply with applicable provisions of federal, provincial and local labour laws and with applicable union regulations.

1.40 Liability insurance

- .1 Provide, during the period this contract is in force, premises liability, including public liability insurance and property damage insurance in the amount of \$5,000,000 inclusive, to be covered against any claims for damage to property or for personal injury, including death, which may arise from operation under this contract, whether such operation is by yourself or by any sub-contractor or anyone directly or indirectly employed by you.
- .2 Upon completion of the contract, have in force a completed operations and products liability insurance, in the amount of \$5,000,000 inclusive, to be covered against any claims for damages to property or for personal injury, including death, which may arise after the premises liability is terminated.
- .3 Maintain the insurance in force for a minimum period of two years after completion of the contract.
- .4 List the Owner as an additional insured.
- .5 The certificates shall state that the insurance will not become ineffective without sufficient written notice to the Owner.
- .6 Submit certificates of such insurance with the Owner before work is begun.

1.41 Liens and affidavits

- .1 The final payment and any part of the retained percentage shall not become due until a complete release of liens arising out of this contract or receipts in full in lieu thereof have been delivered to the Owner.
- .2 Furnish an affidavit to the Owner that the release or receipts include labour and materials for which a lien could be filed.
- .3 If any lien remains unsatisfied after all payments are made, refund to the Owner monies that the Owner may be compelled to pay in discharging such a lien, including costs and reasonable legal fees.

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1.42 Maintenance tasks

- .1 Perform and bring all routine maintenance tasks required by the Inspecting Authorities up to date (i.e. monthly, quarterly, semi-annual, annual, 5-year, Category 1, Category 3, Category 5 requirements, etc.) prior to turning over the unit for public use.

1.43 Materials and workmanship

- .1 Provide all new materials and equipment.
- .2 Install equipment in a neat, accurate, workmanlike manner.

1.44 Materials validity check

- .1 Perform a general materials validity check of components and fastenings that under failure might create a dangerous situation, including, but not limited to, sheave bolts, welds, car slings, gears, worm shafts, sheave shafts, brakes, safeties, guide rails, car platform and any other retained component.

1.45 Measurements

- .1 In the execution of the work, verify all dimensions with the actual conditions in order to do a perfect job.

1.46 Modernization completion and maintenance turnover

- .1 At the completion of the modernization and prior to turning over the elevator for public use:
 - .1 So as to ensure a smooth and harmonious turnover, arrange with the existing elevator maintenance provider a walkthrough of the modernized installation, this walkthrough to be carried out jointly by your modernization supervisor and the existing elevator maintenance provider's maintenance supervisor.
 - .2 Provide to the Owner and Consultant the Test Data Forms signed by both your modernization supervisor and the existing elevator maintenance provider's supervisor together with a signed confirmation that the modernization work has been checked by both parties and both parties are in agreement that the modernization has been completed satisfactorily and poses no problems for ongoing maintenance.

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1.47 Occupied building

- .1 This is an occupied building and normal building routine will have to carry on while this work is being done.
- .2 Take proper care to avoid unnecessary noise, clutter or obstruction in pedestrian areas, and arrange for storage of materials and tools where they will cause minimum inconvenience.
- .3 Where excessive noise or obstruction is in certain cases unavoidable, advise the Owner ahead of time and make suitable arrangements.
- .4 The Owner will allow access to the building and to the work site at times designated by the Owner.
- .5 The Owner will assign storage space, if available, for materials and tools.
- .6 The Owner will allow the contractor's personnel to use designated washrooms.
- .7 Perform work which interferes with tenant comfort or significantly impacts unit operation in overtime or at the times specified by the Owner.

1.48 Operation by persons with physical disabilities

- .1 Ensure that controls and fixtures comply with Appendix E of the Code.

1.49 Operating environment

- .1 Provide material and equipment to function normally within the requirements of the specifications when the ambient temperature is between 3.0 and 36.0 degrees Celsius (38 and 97 degrees Fahrenheit).
- .2 Provide material and equipment to function normally and within the requirements of the specifications when the ambient relative humidity is between 25% and 100% non-condensing.
- .3 Provide material and equipment to function normally and within the requirements of the specifications when the supply voltage is within minus 10% and plus 10% of the nominal voltage and the frequency is within 5% of the nominal frequency.
- .4 Provide equipment needed to meet the specified voltage operating parameters (e.g. filters, isolation transformers, transient voltage surge suppression, etc.).

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1.50 Organization chart

- .1 Provide to the Owner an organization chart from the local supervisory level up.
- .2 Provide to the Owner the names, positions and experience of the field and supervisory personnel associated with this project.
- .3 During the course of the work when organization changes are made, provide the Owner with updated information.

1.51 Overtime premium

- .1 In the event that the Owner, for whatever reason, pays for overtime worked to complete the work as set out in the Specifications, the Owner will pay the added cost of the overtime.
- .2 The added cost shall be the difference between the overtime cost and straight time cost at contract rates.
- .3 Obtain from the Owner prior written authorization for overtime to be worked and chargeable, as described above, to the Owner, this authorization to be for specific amounts and for specific times.
- .4 Submit time sheets for such overtime worked for approval to the Owner or the designated representative of the Owner within 48 hours of the time that such overtime is worked.
- .5 If the procedures as set out above are not followed, assume the costs of the time worked.

1.52 Overtime provisions

- .1 Include overtime labour for work necessary to complete the job, such as emergency power testing, fire alarm testing, cutout, mounting and wiring of hall stations into dispatchers, tasks requiring two or more elevators in a group to be out of service and work that will cause a major disruption of service to the building.

1.53 Owner's General Terms and Conditions

- .1 Abide by the Owner's General Terms and Conditions.
- .2 Where there is a conflict between the Owner's General Terms and Conditions and these specifications the Owner's Terms and Conditions take precedence.

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1.54 Parts

- .1 Supply parts on request for a period of fifteen years subsequent to Substantial Performance of the project, at then prevailing prices.
- .2 Where purchased components are used, ensure that the original manufacturer's name and component designation are clearly marked on the part or in the parts catalogue.

1.55 Patents

- .1 Hold and save the Owner and its officers, agents, servants and employees harmless from liability due to patent or copyright infringement arising from the use of, in the performance of the work or in the completed installation, any invention, process, article, or appliance.

1.56 Payment withheld

- .1 Approval for payment may be withheld to such extent as may be necessary on account of:
 - .1 Defective work not remedied;
 - .2 Claims filed or reasonable evidence indicating probable filing of claims;
 - .3 Failure of contractor to make payments properly to sub-contractors or for material and labour;
 - .4 Failure to work to schedule;
 - .5 A reasonable doubt that the contract can be completed for the balance then unpaid;
 - .6 Damage to the building or another contractor by the elevator contractor or one of their subcontractors.
- .2 When the above grounds are removed, payment will be made for amount withheld.

1.57 Personnel

- .1 Supervise your personnel so that they present a neat appearance and their movement in the building is within the requirements of their work.
- .2 Provide uniforms and photo identification for personnel.

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- .3 The Owner reserves the right to reject or refuse access to personnel or contractors at its sole discretion.
- .4 Assign and maintain a dedicated service representative to the work, this representative to be responsible for liaison with the Owner and the Consultant.
- .5 Assign and maintain a dedicated service supervisor to the work, this supervisor to be responsible for technical communications with the Owner and the Consultant.

1.58 Pre-inspection check list

- .1 Upon completion of each group, review each page of the specifications and initial each page at the bottom left to indicate that the work has been completed in compliance with the Specifications.
- .2 Submit this initialled copy of the Specifications to the Consultant prior to requesting an inspection by the Consultant.

1.59 Preliminary information

- .1 Submit, within 30 working days after awarding of contract, the information and details, including reactions, power requirements, ventilation requirements, cutouts, access requirements, light and outlet locations, quantity, location and size of external wires required to inter-connect the equipment, and all other information required to complete the work to be performed by others in conjunction with the installation of the equipment.

1.60 Protection of the Work and property

- .1 Maintain protection of the Work and protect the Owner's property from injury or loss arising out of the execution of this contract.
- .2 Make good any injury or loss caused by your agents or employees.
- .3 Take all necessary precautions to ensure that the Work is done in a manner that does not endanger any person.

1.61 Regular hours of work

- .1 Regular hours of work are from 07:00 to 18:00 Monday to Friday, excluding holidays.
- .2 Carry out noisy work, work creating excessive odours or work that creates a disturbance to the building tenants outside of regular hours or at such other times

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as selected by the Owner and include in your submission the costs for such overtime work.

1.62 Removal of existing equipment

- .1 Remove and take possession of any existing equipment that is replaced in the course of the execution of the work.
- .2 Remove equipment with prior permission of, and only at times specified by, the Owner.
- .3 Remove and transfer to the Owner equipment that the Owner elects to retain for the Owner's use.

1.63 Removal of rubbish

- .1 Remove rubbish, keep the building and premises clean during the progress of the work, and leave the premises at completion in perfect condition as far as the work under the specifications is concerned.

1.64 Request for payment

- .1 Submit applications for payment with the necessary data, information, waivers and affidavits including certificates of compliance and appropriate statutory declaration.

1.65 Retained equipment

- .1 In the event that retained equipment is in conflict with or incompatible with the new equipment, or is in conflict with alteration Code requirements, note this on the proposal form.
- .2 If no conflicts are noted on the proposal form, pay for any changes or necessary equipment that may be required to complete the work.

1.66 Singular and plural

- .1 In all cases singular and plural shall be interchangeable and shall be applied as required to meet the sense and intent of the Specifications.
- .2 Where the singular is employed it shall be interpreted as necessary, unless otherwise indicated, to apply to all equipment and devices required to produce a complete installation.

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1.67 Special tools and access codes

- .1 If any special tools (i.e. tools that are not readily purchased from a hardware supplier) are used to maintain or adjust the equipment or are required for any aspect of the work on the equipment, list these tools with details on the proposal form and provide such tools to the Owner prior to Substantial Performance.
- .2 If any access codes are used to maintain or adjust the equipment or are required for any aspect of the work on the equipment (including the reading and resetting of error codes and logs) list these access codes with details on the proposal form and provide such access codes to the Owner prior to Substantial Performance.
- .3 Do not change the access codes without the written consent of the Owner and, when changed, provide to the Owner the new access codes.

1.68 Subcontractors

- .1 Bind subcontractors to all applicable portions of the Specifications.
- .2 The contractor shall be responsible for all actions and all work performed by its subcontractors to the same extent as the contractor is itself responsible under the Specifications.

1.69 Submission of proposal

- .1 Submission of a proposal will be considered presumptive evidence that the proposer is conversant with local facilities and conditions, requirements of the Contract Documents and of pertinent provincial and local codes, state of labour and material markets, and in the proposal has made due allowance for all contingencies.

1.70 Taxes

- .1 Include applicable local, provincial and federal taxes or assessments in effect at the time of the signing of the contract.
- .2 Show on the proposal form the amount of each tax included.
- .3 The Contractor is liable for the above mentioned taxes or assessments whether or not specifically mentioned in his proposal or in the final contract document.
- .4 In the event new taxes or assessments, to become due on completion of the contract, are imposed after the signing of the contract these are to be paid, in addition to the original contract amount, by the Owner to the Contractor, who in turn is to pay them to the proper authorities.

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- .5 In the event taxes or assessments in effect at the signing of the contract should be revoked before consummation of the contract rebate to the Owner the amount of such taxes and assessments included in the original contract.

1.71 Technical seminar

- .1 Before the time of Substantial Performance, arrange with the Owner to provide a seminar for the Owner's staff.
- .2 Include in the seminar a complete review of the documentation, operation of the equipment and demonstration of any special features including programming of any display devices.

1.72 Trade marks

- .1 Do not apply trade marks visible to the general public on any piece of equipment.

1.73 Unit inspection by the Consultant

- .1 Advise the Consultant in writing two weeks prior to the completion of a unit so as to arrange an inspection by the Consultant at a mutually convenient time.
- .2 Assist the Consultant in the performance of this inspection to verify that performance figures, workmanship and equipment furnished are in compliance with the Specifications.
- .3 Provide the necessary test weights to carry out full load tests and a team of competent persons to assist the Consultant in making the necessary tests and inspections.

1.74 Warranty of work

- .1 Warrant that the materials, performance and workmanship are in accordance with the industry standard in every respect.
- .2 Make good defects not due to improper use which may develop within one year from the date of Substantial Performance of the project.
- .3 Warrant that the equipment performs to the standards set out herein.
- .4 Neither the final payment nor any provision of the Contract Documents diminishes the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law.

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- .5 Upon written notice remedy defects and pay expenses for damage to others resulting from defects.

1.75 Withdrawal or rejection of proposals

- .1 The Owner reserves the right to reject any or all proposals or to waive any conditions.
- .2 Proposals may not be withdrawn until sixty days after the scheduled date for the receipt of the proposals.

1.76 Work by other trades

- .1 In the event that work by other trades is required and work by others as set out herein is in conflict with or inadequate for your equipment or design, so state on the proposal form with all necessary details.
- .2 If no exceptions are noted on the proposal form, pay the costs of all modifications necessary to suit your equipment and design.

1.77 Work site protection

- .1 Provide, maintain and, after the work is complete, remove protective hoarding around the work site.
- .2 Arrange the protective hoarding so as to prevent public access to the work site.
- .3 Provide substantial wood hoarding at a floor selected by the Owner from which to perform work on the car top and in the cab.
- .4 Paint the hoarding in a colour selected by the Owner and assist the Owner in applying vinyl graphics to the hoarding if required.
- .5 Provide hoarding with a minimum height of 2134 mm (84") above the finished floor.
- .6 Provide hoarding which will allow passage through the elevator lobby at all times.

1.78 Work outside of Division 14 included in contract

- .1 No work by other trades will be provided, act as a General Contractor and hire any sub-trades necessary to complete the project.
- .2 Cover the mechanical and electrical work associated with the upgrades.

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- .3 The related work includes the provision of the following:
- .1 Cutting and patching of machine room walls and floors as needed.
 - .2 Cutting and patching of walls and floors around elevator entrances as needed.
 - .3 Cutting and patching of walls around elevator hall fixtures back boxes and conduits as needed.
 - .4 Heating and cooling by means of an HVAC system in order to maintain continuously (i.e. 24 hours a day) a temperature of greater than 13 degrees Celsius and less than 29 degrees Celsius based on the heat generated by the elevator equipment as follows:

Heat generated (per unit):	when active	
	kW	BTU/h
Elevator 1	4.7	16,000
Elevator 2	5.3	18,250

- .5 Confirmation of a grounded power supply sufficient to start and run the elevators at rated speed and capacity, including the following:
- .1 A disconnect means located in view of the elevator controller near the access to the machine room or control space.
 - .2 Wiring between the disconnect and the elevator power input point (elevator transformer or controller).
 - .3 Protection of the feeder cables for designated firefighters' elevators.
 - .4 The power supply should be capable of absorbing the regenerated power from the system.
 - .5 A lockable power supply, with an isolated ground, capable of supplying for each unit the following starting and running currents in amperes:

Full load up currents	power supply (V)	starting amps	running amps
Elevator 1	600	115	45
Elevator 2	600	160	65

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- .6 A grounding system for the elevator-related electrical equipment for safety and performance.
- .7 An emergency power supply sufficient to start and run one elevator per group at full rated speed and capacity, together with necessary means for absorbing regenerated energy:
- .8 The emergency power will be provided on the same lines and the same disconnect as the normal power;
- .9 The emergency power unit will have means for switching between the normal power supply and the emergency power supply including either a centre-off delay position or means of synchronising the power on changeover so as to prevent surges on the electrical supply to the vertical transportation equipment;
- .10 Four wires will be provided to connect two auxiliary contacts of the emergency power transfer switch to an elevator controller of each group;
- .11 One of these contacts will be so arranged that on normal power the two wires associated with it make a closed circuit and on emergency power present an open circuit; the other contact will be so arranged that the two wires associated with it present a closed circuit except for an adjustable period of time (a 5 to 50 seconds adjustment, set initially at 15 seconds) prior to power supply transfer in either direction - from normal to emergency or from emergency to normal;
- .12 The cab lights to be so arranged as to be functional on emergency power.
- .13 In the elevator machine room, one 15 A 120 V, single phase circuit breaker, located in view of the elevator controller near the access to the machine/control room, to power the cab interior duplex GFCI receptacle (if one is provided).
- .14 Replace existing duplex receptacles in the elevator machine room, hoistway and pit with GFCI receptacles.
- .15 In the machine room, protected 2/28 W T5 fluorescent (or LED) lights controlled by a switch located adjacent to the lock side of the machine room door, located at approximately 2500 mm (8') from floor level and such additional lighting as required to give a minimum illumination of 200 lx at floor level and within the controller, the power for the lighting circuit being derived from the emergency

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- power supply.
- .16 In the elevator pit, protected vapour-proof lights, controlled by a light switch located adjacent to the pit entrance, located clear of elevator equipment to give a minimum illumination of 100 lux at pit level, the power for the lighting circuit being derived from the emergency power supply.
 - .17 An active telephone line run to each elevator machine room (this may already be in place).
 - .18 Where needed, conduit and pulling of wire (provided by the Elevator Contractor) between the machine room, elevator hoistway, and any other remote equipment locations, to be terminated outside the elevator hoistway at a junction box (provided by the Elevator Contractor) at the basement level.
- .4 Carry a \$150,000 total contingency to drill or excavate a jack hole for both elevators in order to accommodate the new cylinder as follows:
- .1 Remove excavated material.
 - .2 Perform soil testing as necessary to verify non-contamination.
 - .3 Provide a casing to the full depth of the excavation to protect the cylinder against sub soil conditions.
 - .4 Provide a metallic casing of minimum diameter 100 mm (4") greater than the PVC liner diameter for depths to 9 meters (30') or less, 150 mm (6") greater for depths to 15 meters (50'), and 200 mm (8") greater for depths in excess of 15 meters (50').
 - .5 Provide a casing of minimum 2.5 mm (12 gauge) wall thickness.
 - .6 Protect the casing against rust and corrosion.
 - .7 Provide a water tight seal at the bottom of the casing and for its full length.
 - .8 Provide a cap for the top of the casing that will seal it against the entry of construction debris.
 - .9 Bolt the cap to the top of the casing.

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2 Separate prices

2.1 Separate price submission requirements

- .1 Submit prices to provide the following:

2.2 Cab: standard finishes

- .1 Remove all existing finishes within the elevator cab, including the floor.
- .2 Provide cab finishes as follows:
 - .1 Provide returns, transom, car door jamb, lintel finished in stainless steel;
 - .2 Retain existing car door panels as follows:
 - .1 Clad inside face of car door panel and leading edge of panel in stainless steel.
 - .2 Wrap finish around leading edge of car door panel and run at least 25 mm along the hoistway side of the car door panel.
 - .3 Provide a new nickel-silver car sill, mounted at a height to accommodate the new cab flooring, allowing for a minimum of 20 mm height for new finished cab floor and setting bed;
 - .4 For non-access walls above the handrail, provide plastic laminate raised panels, to be confirmed by the Owner at the time of shop drawing review, with 1/8" stainless steel reveals and binders;
 - .5 For non-access walls below the handrail, provide plastic laminate raised panels matching the width of the panels provided above the handrail, to be confirmed by the Owner at the time of shop drawing review, with 1/8" stainless steel reveals and binders;
 - .6 Provide a solid suspended ceiling made of four or six stainless steel panels, the number and dimensions of ceiling panels to correspond with the number and width of panels on adjacent cab walls;
 - .7 Provide recessed LED light fixture in each suspended ceiling panel;
 - .8 For Car 1, provide flooring installed flush with the car sill, of which the linoleum selection will be confirmed by the Owner at the time of shop drawing review;

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- .9 For Car 2, provide aluminum checker flooring of minimum 6 mm (1/4") thickness attached securely to the sub-flooring using countersunk flush fastenings;
- .10 Provide a stainless steel kickplate;
- .11 Provide tubular stainless steel handrails, with ends of each handrail returned into the face of the adjacent car wall surface, of an exterior diameter of 38 mm (1.5") and located at the maximum height allowed by Appendix E of the Code;
- .12 Provide stainless steel for areas behind the handrails;
- .13 Hooks for protective pads.
- .14 Provide protective pads covering all exposed wall surface, attached to inconspicuous pad hooks at the top of the cab and reaching to within 100 mm (4") of the car floor.
- .3 Provide vandal-resistant finishes.
- .4 Supply any other material and labour necessary to provide a completed, installed cab including mounting strips, stay plates, base and sound-deadening material.
- .5 Provide cut-outs to accommodate the elevator equipment.
- .6 Provide assistance in finalizing the cab design upon contractor award.
- .7 Provide a minimum of two separate cab renderings.
- .8 Submit for review shop drawings showing the finishes and design.

2.3 Class C3 loading: elevator 2

- .1 Arrange the elevator for Class C3 heavy concentration Loading.
- .2 Provide a car platform, car sling, machine and other elevator components to sustain the static load imposed during loading and unloading.
- .3 Provide elevator equipment to sustain and level 100% of the rated elevator capacity.
- .4 Arrange the equipment to sustain and level 100% of the rated elevator capacity.
- .5 Include the price of completing the cab finishes as per Item 2.2 in the submitted

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price to provide Class 3 loading.

END OF SECTION

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Section 14210 Passenger Elevators

1 General

1.1 General requirements

.1 Conform to Section 14200.

1.2 Type

.1 Modernization of one group of two buried hydraulic passenger elevators designated 1 and 2.

1.3 Data: elevator 1

Elevator 1			
Item	Existing		Modernized
number of units	1		no change
designation	1		no change
licence number	66631		no change
application	passenger		no change
rated speed (m/s, fpm)	0.76	150	no change
capacity (kg, lb)	1140	2500	no change
motor power (kW, HP)	30.8	40	new
operation	group automatic		no change
motor location	submerged		new
pump type	IMO		new
jack type	buried, direct-acting		new
hydraulic piping	above-ground		new
cylinder diameter			no change
corrosion protection	none		PVC
valve assembly	EECO UV-5AT		new
drive type	wye-delta		new, soft start
emergency brake	none		no change
heat exchanger	none		no change
tank heater	none		no change
scavenger pump	none		new
overspeed valve	none		new
pit shut-off valve	provided		new
control system	MCE HMC-1000		new, microprocessor

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front entrances	*1, 2, 3		no change
rear entrances	none		no change
door type	SSCO		no change
hoistway door fire resistance	1.5 hr		no change
entrance width (mm, “)	1070	42	no change
entrance height (mm, “)	2130	84	no change
entrance markings	provided		new
cab width (mm, “)	2030	80	no change
cab depth (mm, “)	1310	52	no change
cab height (mm, “)	2290	90	no change
car door restrictor	none		new
door safety retainers	provided		new
entrance protection	infrared multi-beam		new
door operator	GAL MOH		new, linear
interlocks	GAL MOCP		new
main car station	provided		new
auxiliary car station	provided		new
verbal annunciation	none		new
car position indicator	analog		new, digital in COP
cab emergency lighting	provided		new, in COP
cab communication	hands-free		new
in-cab news monitor	none		no change
car call security	none		provisions
hall call security	none		no change
hall stations (typical)	single riser		new
hall stations (main floor)	single riser		new
hoistway access switches	provided		new, all floors
cab ventilation	provided		new, 2-speed
cab finishes	provided		no change
hall door finish (typical)	painted		repaint
hall door finish (main floor)	stainless steel		new
car door finish	stainless steel		new
hall lanterns	provided		new, integrated with hall PI
in-car lanterns	no provided		new, in COP
hall position indicator	analog		new, integrated with hall lanterns
lobby panel	none		no change

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CACF panel	none	no change
central control monitor	none	no change
car top inspection station	provided	new
car guiding	rollers	no change
load weighing device	none	no change
guide rails	T rails	no change
emergency recall	none	new, manual
firefighter's operation	none	new, phase 1 + phase 2
emergency power	provided	B44-10 compliant
car top railings	provided	no change
equipment guarding	none	no change
operating time		14.0
acceleration rate		0.6 m/s/s

1.4 Data: elevator 2

Elevator 2			
Item	Existing		Modernized
number of units	2		no change
designation	2		no change
licence number	66632		no change
application	passenger (service)		no change
rated speed (m/s, fpm)	0.76	150	no change
capacity (kg, lb)	1590	3500	no change
motor power (kW, HP)	38.5	50	new
operation	group automatic		no change
motor location	submerged		new
pump type	IMO		new
jack type	buried, direct-acting		new
hydraulic piping	above-ground		new
cylinder diameter			no change
corrosion protection	none		PVC
valve assembly	EECO UV-5A		new
drive type	wye-delta		new, soft start
emergency brake	none		no change
heat exchanger	none		no change
tank heater	none		no change

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scavenger pump	none		new
overspeed valve	none		new
pit shut-off valve	provided		new
control system	MCE HMC-1000		new, microprocessor
front entrances	*1, 3		no change
rear entrances	2, PH		no change
door type	2SSO		no change
hoistway door fire resistance	1.5 hr		no change
entrance width (mm, “)	1170	46	no change
entrance height (mm, “)	2130	84	no change
entrance markings	provided		new
cab width (mm, “)	1520	60	no change
cab depth (mm, “)	2160	85	no change
cab height (mm, “)	2410	95	no change
car door restrictor	none		new
door safety retainers	provided		new
entrance protection	infrared multi-beam		new
door operator	GAL MOH		new, linear
interlocks	GAL MO		new
main car station	provided		new
auxiliary car station	provided		new
verbal annunciation	none		new
car position indicator	analog		new, digital in COP
cab emergency lighting	provided		new, in COP
cab communication	hands-free		new
in-cab news monitor	none		no change
car call security	PH lockout		provisions
hall call security	none		no change
hall stations (typical)	single riser		new
hall stations (main floor)	single riser		new
hoistway access switches	provided		new, all floors
cab ventilation	provided		new, 2-speed
cab finishes	provided		no change
hall door finish (typical)	painted		repaint
hall door finish (main floor)	stainless steel		new
car door finish	painted		re-skin, stainless steel
hall lanterns	provided		new, integrated with hall PI

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in-car lanterns	not provided	new, in COP
hall position indicator	analog	new, integrated with hall lanterns
lobby panel	none	no change
CACF panel	none	no change
central control monitor	none	no change
car top inspection station	provided	new
car guiding	rollers	no change
load weighing device	none	new
guide rails	T rails	no change
emergency recall	none	new, manual
firefighter's operation	none	new, phase 1 + phase 2
emergency power	provided	B44-10 compliant
car top railings	provided	no change
equipment guarding	none	no change
operating time		14.0
acceleration rate		0.6 m/s/s

1.5 Dimensions

- .1 Provide equipment to suit the existing machine room, hoistway, pit and overhead dimensions.

2 Products

2.1 Generic equipment

- .1 Provide generic equipment that can be purchased, installed and maintained by any competent vertical transportation contractor.
- .2 Provide equipment that has been installed within the province by at least four different vertical transportation contractors.
- .3 Provide generic controls from MCE, GAL, Automatisation JRT or an approved equivalent.
- .4 Provide proven components that have been used during the last two years as a minimum.
- .5 Provide a written guarantee from the control manufacturer that over the life of the

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installation software and firmware updates will be provided at no charge to the Owner.

2.2 Hydraulic jack

- .1 Provide a new hydraulic jack.
- .2 Provide a jack unit of sufficient size to lift the gross load the height as required to suit the existing travel.
- .3 Factory test the jack unit to ensure adequate strength and freedom from leakage.
- .4 Do not use brittle material, such as gray cast iron or semi steel, in the jack construction.
- .5 Provide a jack unit consisting of the following parts: a plunger of heavy seamless steel tubing accurately turned and polished, a stop ring electrically welded to the plunger to positively prevent the plunger leaving its casing, an internal babbit-lined or bronze guide bearing, packing of suitable design and quality, a drip ring around the casing top, an outer casing made of steel tubing provided with a pipe connection with an air bleeder.
- .6 Use packing of the single sealing edge type of Teflon, Roulon or similar material to reduce wear and friction.
- .7 Provide one bottom bulkhead and one safety bulkhead.
- .8 Provide, in addition to the shut-off valve at the tank, a shut-off valve in the pit.

2.3 Hydraulic: cylinder protection

- .1 Protect the hydraulic cylinder against corrosion with a plastic sleeve so arranged as to provide a water and air tight seal for the portion of the cylinder extending below the pit floor.
- .2 Install the cylinder inside a protective pipe as follows:
 - .1 Use ABS or PVC pipe;
 - .2 Seal the pipe so as to provide a water and air tight seal;
 - .3 If joints are required, weld them with solvent or heat;
 - .4 Provide a minimum pipe wall thickness of 6 mm (1/4");

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- .5 Provide a pipe of sufficient diameter and length to allow a free space of at least 38 mm (1.5") between the cylinder and the protective pipe.
- .3 Provide an air and water tight seal between the top of the pipe and the outside of the cylinder wall.
- .4 Provide a means of monitoring the space between the cylinder wall and the protective pipe to detect any unwanted liquids.
- .5 Provide four ports with removable threaded plugs at the top of the pipe spaced at 90 degrees around the pipe circumference.
- .6 Arrange the port access and pipe to cylinder space so that a fibre optic probe can be inserted to allow visual examination of the interior space and the state of the pipe and cylinder walls.
- .7 Provide an evacuation port to allow the removal of unwanted liquids that have breached the protective liner.

2.4 Cylinder warranty

- .1 In addition to any other warranties, warrant the cylinder and PVC liner for a period of twenty years.
- .2 In the event of failure or leakage of the cylinder or PVC liner during the warranty period take the necessary steps to correct the problem including, as necessary, replacement of the PVC liner and cylinder.
- .3 Remove soil contaminated by the failure or leakage of the cylinder or PVC liner.

2.5 Buffer channel

- .1 Provide, if necessary, a new buffer channel wide enough to accommodate the new jack with its cylinder protection.

2.6 Pit equipment

- .1 Remove rust from the pit equipment and scrape to the bare metal surface.
- .2 Protect the equipment in the pit, except for machined surfaces and non-rusting surfaces, with two coats of a rust inhibiting primer of a neutral colour.
- .3 Make good the pit floor after the installation of the new jack.

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2.7 Hydraulic: pumping machine unit

- .1 Provide a pumping machine unit compactly and neatly designed with all the components as follows in a self-contained unit: drip pan, floating inner base for mounting motor pump assembly, oil reservoir with tight fitting tank cover, oil fill strainer with air filter, self-cleaning strainer in suction line, oil hydraulic pump, electric motor, oil control unit.
- .2 Provide an oil level gauge that can be read without removing the tank cover.
- .3 Provide, to measure the oil temperature, a thermometer that can be read without removing the tank cover.
- .4 Provide a pump especially designed and manufactured for oil hydraulic service of the rotary positive displacement type inherently designed for steady discharge with minimum pulsations to give smooth and quiet operation.
- .5 Provide a motor designed for oil hydraulic service.
- .6 Provide equipment which will deliver its rated output continuously with a temperature rise not to exceed 50 degrees C (90 F).
- .7 Provide an oil control unit consisting of the following components: relief valve, safety check valve, levelling valve, manual lowering valve, tank shut-off valve.
- .8 Design the equipment so that all adjustments are accessible and can be made without removing the assembly from the oil line.
- .9 Provide variable flow bypass valves to give controlled high and levelling speed operation.
- .10 Provide valves with individual adjustments, such that changing one adjustment does not affect other adjustments.
- .11 Provide an externally adjustable relief valve capable of by-passing the total oil flow without increasing the back pressure more than 10% above that required to barely open the valve.
- .12 Provide a 50 mm (2") pressure gauge, complete with isolating shut-off valve, for measuring the setting of the relief valve.
- .13 Design the safety check valve to close quietly without permitting any reverse flow and to support the elevator on a positive locked column of oil when the car is at rest.

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- .14 Provide an externally adjustable up start valve to by-pass oil flow during initial start of the motor pump assembly, and to close slowly, gradually diverting oil to the jack unit, insuring smooth up starts, so as to relieve load on the motor during starting.
- .15 Provide an externally adjustable lowering valve and levelling valve for drop away speed, lowering speed, levelling speed and stopping speed to insure smooth down starts and stops.
- .16 Provide a manual lowering valve for manual lowering of the elevator car in the event of power failure and for use in servicing and adjusting the elevator mechanism.
- .17 Provide shut off valves in the machine room and elevator pit for isolating oil in the power tank unit to facilitate servicing and adjusting the elevator mechanism without removing the oil from the tank.
- .18 Provide self cleaning strainers to prevent foreign materials from lodging in the oil system.
- .19 Provide an externally adjustable up stop valve to by-pass the oil flow for landing stops in the up direction.
- .20 Provide temperature and pressure compensation so as to minimize speed variations.
- .21 Arrange the equipment so that the car stops at the landing through controlled oil flow with the motor and pump running and so that the motor shuts off only after the car has come to rest at the landing.
- .22 Use flexible hose on the pumping machine unit where required but only within the regulations of the governing safety codes.
- .23 Provide a tank of sufficient capacity to contain, as a minimum, all of the oil in the hydraulic system (pipe lines and hydraulic cylinder) plus 10%.

2.8 Hydraulic piping

- .1 Provide pipes and fittings to connect the power unit to the jack unit.
- .2 Seal connections adequately to prevent any leakage or seepage of oil.
- .3 Provide pipe of minimum 50 mm (2") nominal size to reduce oil velocity, noise and vibration.
- .4 Run the oil lines above ground and suspend the oil lines with isolating hangers to

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reduce sound transmission.

2.9 Hydraulic fluid: biodegradable

- .1 Provide hydraulic fluid of the non-toxic, inherently or readily biodegradable type.
- .2 Provide hydraulic fluid having a minimum viscosity index of 95.
- .3 Provide mineral oil (do not use vegetable oil).

2.10 Hydraulic motor starting

- .1 Start the hydraulic pump motor after the doors start to close so that the motor is running at full speed before the doors are fully closed.
- .2 Stop the hydraulic pump motor if the door closing operation is interrupted.
- .3 Provide solid state control of the starting operation so as to limit the motor starting current to not more than two times the full load running current.
- .4 Energize the hydraulic machine up start valve, subject to the standard safety circuits, after the doors are closed and a signal is received from the solid state starter indicating that the motor is up to operating speed.

2.11 Hydraulic: time protective device

- .1 Provide a time protective device.
- .2 If the pump motor should run continuously for 20 seconds longer than the period of time necessary to move the elevator (in normal operation) from the bottom floor to the top floor, the time protective device will cause:
 - .1 Up direction relays and contactors to be de-energized.
 - .2 Automatic registration of a bottom floor call to bring the car to the lowest landing where it will remain with its doors open.
 - .3 No response to any further hall calls or car calls until the main line switch has been opened and closed again.

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2.12 Hydraulic: main line strainer

- .1 Provide a main line strainer and shut off cock assembly of the self cleaning type, equipped with a 60 minimum mesh element, and a magnetic drain plug, in the oil line.
- .2 Design the unit for a minimum 2800 kilopascals (400 psi) working pressure and provide easy access for cleaning.

2.13 Hydraulic: silencing devices

- .1 If the motor and pump are not submersible:
 - .1 Enclose the power unit on all four sides with sheet steel panels combined with 20 mm (3/4") suitable sound-deadening material;
 - .2 Form the panels with approximately 20 mm (3/4") returns, returning to, but separated from, the main power unit frame with suitable rubber mouldings.
- .2 To reduce hydraulic pulsations through the oil, provide a blow-out proof double-faced hydraulic muffling device in the oil line adjacent to the power unit, downstream to the valve assembly.
- .3 To reduce any vibration transmitted through the oil line itself, provide two approved blow-out proof sound isolating couplings in the oil line, located between the check valve and the hydraulic jack.
- .4 Design each sound-isolating coupling to completely eliminate any solid metal to metal contact from the pipe on one side of the coupling to the pipe on the other side.
- .5 Mount the motor and pump on a resilient rubber base to isolate them from the oil reservoir, controller and building structure.

2.14 Hydraulic: scavenger pump

- .1 Provide a scavenger pump for each cylinder to return oil leaking through the packing to the tank of the pumping unit by automatic means.
- .2 Adequately filter the oil returned by the scavenger pump.
- .3 Provide a float switch in the pit to shut off the scavenger pump in the event of high water level so as to prevent water being pumped into the tank.

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- .4 Provide a check valve at the hydraulic machine in the scavenger pump oil line to prevent oil flowing from the reservoir in the event the scavenger pump line is ruptured.
- .5 Provide fire-resistant tubing for the scavenger pump oil line.
- .6 Securely fasten the scavenger pump unit to the pit floor.

2.15 Overspeed valve

- .1 Provide an overspeed valve in the elevator pit.
- .2 Use Victaulic couplings to connect the valve in the oil line.
- .3 Provide a data tag on the valve showing the operating pressure, maximum pressure rating and overspeed setting.
- .4 Arrange the valve to operate in the event that the elevator speed in the down direction exceeds 125% (plus or minus 10%) of the elevator operating speed in the down direction
- .5 Arrange that the valve cuts off the flow of oil from the hydraulic jack in the event that the set tripping speed is exceeded.
- .6 Arrange that when the valve operates the elevator will be decelerated at a rate of not less than 0.25 g nor more than 1.00 g with any peak deceleration rate in excess of 2.50 g having a duration of not more than 0.04 seconds.
- .7 If the valve is field-adjustable, provide a numbered seal and record the date and number in the log book.

2.16 Hydraulic pit shut-off valve

- .1 Provide a pit shut-off valve for the hydraulic jack.

2.17 Speed

- .1 Arrange the elevators to run under any condition of loading, except the case of overload, within 1.5 percent of the rated speed.

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2.18 Solid-state hardware

- .1 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.
- .2 Gold plate the contact points of edge connectors.
- .3 Use G10 glass epoxy with minimum equivalent 57 gram (2 ounce) copper.
- .4 Coat the circuits with tin-lead.
- .5 Provide a solder resist screen.
- .6 Provide plated through holes for double sided boards.
- .7 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .8 Do not provide "patched" connections.
- .9 Design solid-state devices for a high level of noise immunity.
- .10 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.
- .11 Provide filters and circuits to limit the generated electromagnetic noise level at any frequency to not more than 0.1 db above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.
- .12 Provide filters and circuits to limit the generated electromagnetic noise level at 10 KHz to not more than 0.01 db above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

2.19 Auxiliary slowdown devices

- .1 Provide auxiliary slowdown devices compatible with the solid state speed control and so arranged that, if the normal slowdown devices fail to operate correctly, the elevator will be brought to a controlled stop at the terminal landing with an acceleration not exceeding 0.3 g.
- .2 Arrange the control circuits so that, if the auxiliary slowdown devices were required

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to act to stop the elevator, the elevator parks at the terminal landing until the system is checked by a maintenance technician.

2.20 Controller

- .1 Provide a micro-processor based controller designed to give the required operation as herein specified.
- .2 Mount panels securely on substantial, self supporting steel frames designed for floor or wall mounting.
- .3 Provide completely enclosed controllers with covers.
- .4 Do not mount equipment on the covers.
- .5 Where relays are used, provide those having a design electrical life and mechanical life equivalent to thirty years operation in the given application, with their contacts designed for maximum conductivity and wiping action.
- .6 Provide electronic time delay devices which employ stable capacitors or crystals as the time base.
- .7 Install wiring on the controller, whether control or field wiring, in a neat workmanlike order and make connections to studs and terminals by means of solder or solderless lugs, or similar connecting devices.
- .8 Mark relays, contactors, fuses, printed circuit boards and other components clearly and permanently with designations as shown on the schematics.
- .9 Mount the designations for plug in components on the controller adjacent to the component; do not mount the designation on the plug in component.
- .10 Provide a written guarantee from the control manufacturer that over the life of the installation software and firmware updates will be provided at no charge to the Owner.

2.21 Computing devices

- .1 Where computing devices are used, such as micro-processors or mini-computers, along with associated devices, design to the following requirements:
 - .1 Isolate the inputs from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices;

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- .2 Provide the control program on read-only-memory with spare capacity to allow for future programming modifications and extensions;
- .3 Provide crystal regulation of frequency;
- .4 Provide for separate regulated power supplies to serve each micro-processor system.

2.22 Power interruption restart

- .1 Provide means so that the elevator system will restart automatically in the event of power interruption.
- .2 Where volatile memories are provided for position and other data necessary to the continuing operation of the elevators, provide means of preserving this data on power failure or fading ('brownout') for a minimum of four hours and means of automatic recovery upon restoration of normal power.

2.23 Control circuits grounding

- .1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.
- .2 An external circuit is defined as one wired outside micro-processors or solid-state devices, as for example, buttons, relays, lights, limits, locks and such similar devices.
- .3 Arrange that accidental grounding in the control system will not defeat the safety circuits.

2.24 Position transducer

- .1 Provide a position transducer device to transmit to the control system the position of the elevator.
- .2 Arrange that the device transmit a minimum of 10 counts per 25 mm (1") of travel.
- .3 Provide a device having an overall precision within ± 1.0 mm (± 0.04 ").
- .4 Arrange the elevator controls so that the output from this device is read at least every 5 ms.
- .5 Transmit the signal from this device either in serial format using a standard protocol (e.g, CAN) or in parallel format using low impedance (less than 10 kilohms) inputs.

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- .6 If the transducer is a relative (pulse counter) type rather than an absolute encoder type:
 - .1 Provide gray encoding so as to indicate the direction of movement of the car and to offset 'false' counts caused by vibration;
 - .2 In the event of a counter error reset the position with an accuracy within ± 2.5 mm (± 0.1 "") by returning the car at low speed to a fixed point in the hoistway.

2.25 Main floor elevator markings

- .1 Provide at the main floor, for each elevator designated as a Firefighter's Elevator, a suitable symbol such as a Firefighter's Hat.
- .2 Provide at the main floor for each elevator a numeral indicating the number of the elevator.
- .3 Provide markings as selected by the Owner.
- .4 Provide samples for review.

2.26 Entrance floor markings

- .1 Provide, on each hall entrance jamb, raised tactile and braille metallic markings to designate the floor.
- .2 Provide markings as selected by the Owner.
- .3 Provide samples for review.

2.27 Car door restrictor

- .1 Provide a car door restrictor to mechanically prevent the opening of the car door from inside the cab unless the elevator is in the door unlocking zone.
- .2 Provide a device that does not require electrical or electronic components to function.

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2.28 Car and hoistway door safety retainers

- .1 Provide safety retainers at the top and bottom of horizontally sliding doors to retain the closed door panel in position if the primary guiding means fail.
- .2 Provide retainers that will prevent the displacement of the door panel top and bottom by more than 20 mm (0.8") when the door panel is subjected to a force of 5 000 N (1130 lbf) applied towards the hoistway at right angles to the panel over an area of 300 mm by 300 mm (12" by 12") at the centre of the panel.
- .3 Provide retainers that will withstand, without detachment or permanent deformation, a force of 1 000 N (225 lbf) applied upward at any point along the width of the door panel together with an additional concurrent force of 1 100 N (250 lbf) applied at right angles to the door at the centre of the panel over an area of 300 mm by 300 mm (12" by 12").
- .4 Arrange that the retaining means are not involved in the guiding of the panel and are not subjected to wear or stress during normal door operation.

2.29 Hoistway entrance lunar key access

- .1 Provide lunar key access for each hoistway entrance.

2.30 Hoistway doors: opening gap

- .1 For centre-opening doors adjust the hoistway door equipment, interlocks, up-thrust retainers and associated equipment so that a manual force of 100 newtons (20 pounds) exerted in a direction tending to force the door panels apart, will not allow a gap in excess of 7 mm (1/4") to appear between the door panels.

2.31 Door detector: multiple beams

- .1 Provide a multiple infra-red beam door detector device.
- .2 Design and locate the receivers and emitters so that the active area of the door opening, i.e. the full width and from within 25 mm (1") of the floor to a height of 1800 mm (6'), is protected, such that a person or object passing through the car entrance causes the doors to re-open.
- .3 Position the receivers and emitters at least 25 mm (1") back from the leading edge of the door.
- .4 Provide logic control to ensure that each receiver receives light from every emitter.
- .5 Arrange that if the system fails to provide protection over the active area of the

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door opening, the elevator will park at the current floor with its doors open and the lights off, or the system will go over to nudging operation.

- .6 Provide a signal on the unit or in the machine room to indicate that a failure has occurred.
- .7 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to go over to nudging operation.
- .8 Arrange the nudging operation as follows:
 - .1 Cause the doors to close slowly under reduced power;
 - .2 Operate a buzzer in the car panel as a warning to the person obstructing the door;
 - .3 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.
- .9 Supply a device, reliable and consistent in operation, not affected by dust or temperature changes, and having inherent long term reliability with minimum maintenance.

2.32 Door operator (linear)

- .1 Provide a heavy duty door operator to open and close the car and hoistway doors simultaneously.
- .2 Mount the operator on the cab above the car doors.
- .3 Provide either one or two permanent magnet synchronous AC drive motors rated at a total of 250 W (1/3 HP) minimum.
- .4 Arrange that the operator functions on a single phase 110 or 220 VAC supply.
- .5 Provide a solid state motion control system using a DC link (single phase AC to DC to three phase variable frequency AC).
- .6 Provide event logging with non-volatile memory so as to retain the event log under power-off conditions.
- .7 Directly connect the operator motor or motors to a circulating flat belt with integral teeth (power timing belt).

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- .8 Connect the belt to the door panels so as to move the door panels as the operator motor turns.
- .9 Provide a solid state door operator control incorporating negative feedback circuits for position, acceleration, velocity and torque.
- .10 Provide fully automatic installation algorithm profiles that self-adjust the motion profile for the relevant parameters.
- .11 Provide an output from the door control for a pre-start command to the elevator speed control system.
- .12 Provide optical isolation for input and output signals.
- .13 Provide signal line short circuit protection.
- .14 Provide a serial input to the door control to allow adjustment of speed, acceleration, torque and pre-start point using a notebook computer or keypad.
- .15 Provide the keypad or software for a standard notebook computer.
- .16 Arrange that the settings for the door operator can be uploaded to the keypad or notebook computer and then downloaded to another identical operator.
- .17 Provide an average door closing speed of 300 mm (12") per second, respecting the parameters for door force and door inertia as set out in the elevator code.
- .18 Provide an average door opening speed of 700 mm (28") per second.
- .19 Provide, either in the door operator control or in the main elevator control, means to automatically recycle the doors in the event that they stall during the opening or closing operations.
- .20 Design the door operator and associated components for a minimum of noise.

2.33 Hoistway doors: refurbishing

- .1 Replace any existing steel hall door hanger rollers with plastic insert rollers.
- .2 Check and replace gibs, rollers, hangers, relating cables, closers and all other door components that have more than 10 per cent wear.
- .3 Provide new interlocks, GAL or approved equivalent.
- .4 Provide new clutches or vanes as necessary so that the master door operator can

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- drive the hoistway doors.
- .5 Replace any relating cables that are not 7X19 stranding with 7X19 cables.
- .6 Install sound absorbing materials so as to eliminate interlock noise.
- .7 Replace astragals (car and hall doors).
- .8 Clean, lubricate and re-adjust car and hoistway door equipment.
- .9 Adjust the doors so that with the door closing device disconnected, the doors can be started into motion, from any position, with a force of less than 25 Newtons per door panel applied horizontally at the mid-point of the door in line with the direction of movement of the door.
- .10 Adjust the hoistway door rollers so as to obtain 6 mm (1/4") clearance from the car sill and on either side of the skate.
- .11 Adjust the hoistway door roller pressure so that when engaged in the skate both rollers exert a firm pressure on the skate.
- .12 Eliminate any rattles, loose connections or worn bearings that might cause noise.

2.34 Car stations: main and auxiliary

- .1 Provide two car operating panels, one main and one auxiliary.
- .2 Provide in each panel the devices required for normal automatic operation, including the following:
 - .1 Floor push buttons;
 - .2 Door open button;
 - .3 Door close button;
- .3 Number the car call buttons to correspond to the floor served.
- .4 Provide in conjunction with the car buttons a call registered light for each button to be lighted when the button is pressed and extinguished when the car stops at the selected floor.
- .5 Provide, only when required by the prevailing codes, a stop switch located in the service cabinet, arranged to stop the elevator and to duplicate the functions of the alarm button.

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- .6 Provide a locked service cabinet, located below the main car station, containing those devices, other than those used for normal automatic operation, required for the various control features, including the following:
 - .1 Light switch;
 - .2 Fan switch;
 - .3 Emergency lighting test switch.
- .7 Engrave the car station with markings and signage such as car capacity, elevator number and other markings required by the prevailing codes and local regulations.

2.35 Signal lights

- .1 Provide LED position indicators and call registered lights having a minimum contrast ratio of 8:1 throughout a life expectancy greater than 100,000 hours.
- .2 The contrast ratio is to be determined by subtracting the brightness of the indicator background from the brightness of the marking and then dividing the result by the brightness of the background.
- .3 Arrange that the variation in intensity and contrast ratio between position indicators does not exceed 5 percent.
- .4 Arrange that the variation in intensity and contrast ratio between call registered lights does not exceed 5 percent.
- .5 All measurements are to be made in ambient lighting conditions meeting Code requirements.

2.36 Cab fan and light 'Green Control'

- .1 Arrange that the cab lights and fan are turned off in five minutes when:
 - .1 The elevator is level at a floor;
 - .2 The elevator doors are closed;
 - .3 The elevator has not been selected to answer a call;
 - .4 The elevator is on automatic operation;
 - .5 The elevator safety circuit (including interlocks) is intact.

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- .2 Should any of the above conditions no longer obtain or when emergency communication devices are initiated, turn the car lights and fan on within 0.5 seconds.

2.37 Car position annunciator

- .1 Provide automatic verbal announcement to announce the floors and to provide floor passing tones.
- .2 Provide a unit to meet the requirements of the Code.
- .3 Provide a key switch in the service cabinet to allow the option of having floor passing tones or verbal announcements or neither one.
- .4 Provide means in the service cabinet to adjust the volume over a range from 55 and 70 decibels.
- .5 Use a female voice for the announcements.

2.38 Car position indicator

- .1 Provide a digital car position indicator mounted above each car station.
- .2 Arrange the indicator to display a number or symbol at least 50 mm (2") high.
- .3 Indicate the position of the car at all times, corresponding to the landing through which the car is passing or at which it is stopped.
- .4 Provide a segmented display using light emitting diodes with a minimum of 16 segments per character.
- .5 Arrange the circuits so as to provide continuous indication of car position.
- .6 Overlapping dual indication, when the elevator is between floors, is acceptable.
- .7 Cover the opening for the existing car position indicator in a seamless manner, replacing, if necessary, the existing transom.

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2.39 Emergency lighting

- .1 Provide a back-up battery power system for alarm bell operation and emergency cab lighting.
- .2 Provide a lighting level of at least 11 lux of illumination at the car operating panels for a minimum period of four hours, using at least two lamps of equal rating.
- .3 Cause the lamps to be immediately energized in the event of a power failure or electrical fault de-energizing the normal elevator lighting circuit.
- .4 Provide for the automatic disconnection of the lamps and the automatic recharging of the lighting unit when normal power is restored to the elevator lighting circuit.
- .5 Provide a rechargeable battery of the hermetically sealed type, or of a type which provides a reserve of electrolyte, capable of operating unattended and requiring no addition of water or electrolyte for a period of not less than ten years, with provision for visual checking of the electrolyte level without opening the battery or removing caps or fittings.
- .6 Arrange the battery charging to operate automatically upon restoration of normal power to the unit, to remain in operation until the battery is fully recharged and to maintain the battery at full rated capacity at all times when the unit is not in operation.
- .7 Provide a pilot lamp to indicate that the normal power supply to the unit and battery charging is in operation.
- .8 Arrange that the unit can be conveniently tested and operated manually.
- .9 Install the unit as part of the car so that it is not readily removed.
- .10 Do not provide portable equipment.
- .11 Install the lamp fixture above the car station.
- .12 Provide an emergency lighting test switch in the car service cabinet or behind the car swing return.

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2.40 Telephone: hands-free operation

- .1 Provide a hands-free telephone with automatic dialer capable of initiating and receiving calls.
- .2 Integrate the telephone into the car station.
- .3 Provide a push button to initiate the telephone connection.
- .4 Arrange that the telephone connection can be initiated by an external call.
- .5 Provide an indicator light to confirm that communication has been established.
- .6 Pierce the car station for the push button and indicator light with the indicator light mounted flush with the panel.
- .7 Provide a speaker/microphone for communication.
- .8 Pierce the car station in front of the speaker with multiple holes 3 mm (1/8") in diameter to allow passage of sound to and from the speaker.
- .9 Identify the telephone and the button with a raised symbol and Braille.
- .10 Provide wiring for the telephone from the cab to the machine room.
- .11 Provide a communication station in the machine room.
- .12 Connect the wiring on the car to a terminal block mounted in or adjacent to the telephone box.
- .13 Terminate the wiring in the machine room at a separate enclosed external terminal block mounted on the controller.
- .14 Provide the terminal block and its enclosure and locate it so that personnel other than elevator mechanics can easily run their conduit and wiring to these terminals without interfering with or touching the elevator wiring or controls.
- .15 Where more than one controller is in a common machine room bring wiring to one common terminal block.
- .16 Clearly mark the terminal block.
- .17 Provide wiring of the twin conductor shielded type with grounded shields.
- .18 Provide equipment and wiring compatible with and acceptable to the telephone

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company providing service to the project.

- .19 Provide material and labour as necessary so as to ensure that the communication system meets the requirements of the Code.

2.41 Security system

- .1 Provide for the installation of an elevator card reader security system.
- .2 Provide accessible space, mounting supports and wiring for a security antenna in the cab main front return panel.
- .3 Provide a free space 100 mm (4") in height, 175 mm (7") in width and 75 mm (3") in depth centred behind the car panel insert for the security antenna installation.
- .4 Provide in front of the security antenna a translucent polycarbonate cover.
- .5 Provide an elevator security interface box in the machine room mounted on the side of an elevator controller.
- .6 Provide wiring from the car station card reader to the security interface box using standard connectors.
- .7 Interface with the security system using serial data transfer.
- .8 Provide a signal, unique for each car call, to the security system when a car call "request" (which could either be by means of a button or touch screen) is entered and enter the car call when a return signal is received from the security system validating the request.
- .9 Arrange that the elevator system functions without restriction by the security system when Firefighters' Emergency Operation or independent service is operative.
- .10 Until such time as the security system is installed, arrange that the elevator system functions without restriction by the security system.
- .11 Provide any incidental elevator material and elevator work necessary to obtain a complete functioning elevator security system.
- .12 Submit for review, interface box drawings, location drawings and electrical schematics.

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2.42 Floor lock-off key-switch: floor PH

- .1 Retain the lock-off key-switch in the car station for the floor PH hall push button.
- .2 Arrange that the elevator system functions without restriction by the security system when Firefighters' Emergency Operation or independent service is operative.

2.43 Closed circuit camera security system

- .1 Provide necessary wiring and hardware for the future installation of a closed circuit camera in the elevator cab.
- .2 Provide wiring terminated in a junction box on the elevator car top labelled "Elevator CCTV Provisions" from the elevator to a separate junction box in the elevator machine room (location to be determined by Owner) labelled "Elevator CCTV Provisions".
- .3 Provide one RG6/U stranded centre conductor coaxial cable and one pair 18 gauge stranded conductor cable within an overall braided shield or such other interconnections as may be required by the CCTV contractor.
- .4 Provide an excess loop of 3050 mm (10') of cable at either end.
- .5 Provide a 110 vac power source labelled "Elevator CCTV Power" on the cab to power the camera.

2.44 Hall push button stations

- .1 Replace the existing hall push button stations with new hall push button stations.
- .2 Provide at the intermediate floors, for each station, up and down push buttons located one above the other and call registered lights.
- .3 Provide at the upper terminal and lower terminal, for each station, a single button and call registered light.
- .4 Illuminate the call registered light only when there is an elevator in service to respond to the call.
- .5 Install the stations substantially flush with the wall (i.e. do not use surface mount stations).
- .6 Secure the hall push button stations to the wall using countersunk spanner head fasteners or approved equivalent.

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2.45 Hoistway access switch

- .1 Provide hoistway access switches at all floors.
- .2 Locate the switches in the entrance frame or in the sight guard.

2.46 Cab ventilation

- .1 Provide an exhaust fan capable of developing 30 pascals (0.1" H₂O) static pressure differential with a minimum capacity of 165 litres per second (350 cfm).
- .2 Provide a two speed motor for the fan with the speed control located in the car operating panel.
- .3 Arrange that the increase in noise level caused by the fan, measured in the car with the fan running at maximum speed, does not exceed 3 decibels.

2.47 Protective pads

- .1 Provide protective pads covering all exposed wall surface, attached to inconspicuous pad hooks at the top of the cab and reaching to within 100 mm (4") of the car floor.
- .2 Provide one set of protective pads for each elevator to match the existing pad hooks.

2.48 Car door: stainless steel

- .1 Re-skin the stainless steel hall door such that surface defects will not show under reflected light.

2.49 Hall door: stainless steel: main floor

- .1 Provide a new stainless steel hall door finished such that surface defects will not show under reflected light.

2.50 Hall door finish: typical floor: repaint

- .1 Prepare the existing typical hall doors and refinish in prime coat such that spot welds or other surface defects will not show under reflected light.
- .2 Apply a subsequent high gloss finish in a colour to be determined by the Owner.

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2.51 In car lanterns and gongs

- .1 Provide in car lanterns complete with electronic gongs in the car station to indicate the future direction of the elevator.
- .2 Arrange the lanterns and circuits so that as the car doors start to open in response to a call, the lanterns illuminate and the gong strikes.
- .3 Sound the gong once to indicate the up direction and twice to indicate the down direction.
- .4 Maintain the lantern illuminated until the car has stopped and the door open time has elapsed.
- .5 Do not illuminate the lantern on a door re-open unless the re-open is caused by a reversal of direction of travel of the car.
- .6 Arrange the operation of the lanterns and gongs to comply with requirements for persons with physical disabilities.
- .7 Provide LEDs for illumination.
- .8 Design the fixture so that the lamps may be readily changed. Do not mount any equipment to the covers; arrange that the covers can be removed completely without disturbing the electric wiring.

2.52 Hall position indicator and lantern

- .1 Provide a combined digital position indicator and hall lantern mounted above the main floor entrance.
- .2 Arrange the indicator to display a number or symbol at least 50 mm (2") high.
- .3 Indicate the position of the car at all times, corresponding to the landing through which the car is passing or at which it is stopped.
- .4 Provide a segmented display using light emitting diodes with a minimum of 16 segments per character.
- .5 Arrange the circuits so as to provide continuous indication of car position.
- .6 Overlapping dual indication, when the elevator is between floors, is acceptable.
- .7 Provide lanterns complete with electronic gongs to indicate the future direction of

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the elevator.

- .8 Do not mount any equipment to the covers; arrange that the covers can be removed completely without disturbing the electric wiring.
- .9 Provide lanterns of minimum 50 mm (2") size in the smallest direction.
- .10 Provide means to adjust the gong volume in a range from 55 and 70 decibels.
- .11 Cover the opening for the existing position indicator in a seamless manner, replacing, if necessary, the existing transom.

2.53 Car inspection devices

- .1 Provide, on the top of the car, a fixed lamp receptacle, with switch, outfitted with wire clamp guards, and a GFI duplex receptacle with safety ground connection.
- .2 Provide, on the top of the car, an inspection station consisting of an emergency stop button, up, down and common inspection running buttons, on-off switch for the door operator and other devices necessary for top-of-car inspection operation.

2.54 Load weighing device: elevator 2

- .1 Provide a pressure transducer to measure the load in the car within an accuracy of $\pm 8\%$ of the elevator capacity.

2.55 Sliding guides: retain

- .1 Retain the existing sliding guides.
- .2 Provide new non-metallic liners.
- .3 Adjust the sliding guide to secure good contact with the rail.

2.56 Guide rails: retain

- .1 Retain the existing guide rails and brackets.
- .2 Ensure that the guide rail system is of structural strength and rigidity sufficient to limit the horizontal deflection of the guide at any point to less than 0.6 mm (0.025") under normal conditions of operation.
- .3 Align guide rails with a variation of not more than 1.6 mm (0.06") over any 6 m (20') section and with a maximum variation of not more than 0.8 mm (0.03") in 25 mm

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(1").

- .4 Ensure that the guide rails and brackets are installed in a strong and substantial manner.
- .5 Extend rails to within less than 300 mm (12") and more than 150 mm (6") of the underside of the overhead slab.

2.57 Machine room equipment guarding: hydraulic elevators: component guarding

- .1 Provide component guards for the hydraulic machine, high-voltage components, tripping hazards and any other machine-room items that present a hazard to personnel.
- .2 As an alternative to individual guards for the external motor and belts, provide an expanded metal screen around the lower part of the hydraulic machine.
- .3 Provide machine room equipment guarding in accordance with the prevailing regulations and these specifications.
- .4 Provide drawings of the guarding under the seal of a Professional Engineer.
- .5 Where expanded metal screens are used for guards construct them of minimum 2.2 mm thick metal so supported and braced as to deflect not more than 15 mm when subjected to a force of 450 N applied perpendicularly to the screen at any point
- .6 Arrange the guards so as to prevent hands, arms, or any other part of a worker's body from coming in contact with moving parts
- .7 Affix the guards in a strong and substantial manner so that they cannot be accidentally removed.
- .8 Construct the guards of durable materials that can withstand the workplace conditions.
- .9 Arrange the guards to protect from falling objects so that no objects (such as tools) can fall into moving parts or into open electrical components.
- .10 Ensure that the guards do not themselves create a hazard (such as shear point, a jagged or sharp edge).
- .11 Provide removable guards such that regular maintenance procedures can be performed.

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- .12 Arrange the guards so as not to impede a worker from performing the Work efficiently and conveniently.
- .13 Wherever practicable, arrange the guards so that those devices requiring regular attention can be maintained without removing the guards.
- .14 Wherever practicable, provide fixed guards that cannot be easily removed.
- .15 Finish the metal components of the guarding devices in a bright yellow paint with one base primer coat and two finishing coats or, alternatively, in baked enamel, so as to make them highly visible.
- .16 Where polycarbonate covers are used, add marking stripes of tape in bright yellow so as to make them highly visible.
- .17 Provide protective guards for high voltage circuits.
- .18 Arrange that those elements of the controller with potentials to ground in excess of 130 volts are separated from the low voltage elements by means of barriers that can be removed for maintenance and repair purposes.
- .19 Provide barriers consisting of clear polycarbonate covers (where consistent with the prevailing regulations), hinged so as to allow access without removing the covers.
- .20 Arrange the barriers so that they are of sufficient dimension that the controller covers cannot be closed completely when the barriers are in the open position.
- .21 Provide an entry in the elevator maintenance logbook confirming that the elevator controller covers and doors are closed and that the machine room guards are in place and functioning properly, this entry to be checked when performing regular maintenance.
- .22 Where the status (in motion or stationary) of the lift machine cannot be visually determined as viewed from the disconnect switch, provide at the machine a manually opened and closed stop switch to prevent movement of the elevator.

2.58 Car top guard: retain

- .1 Retain the existing car top guard.
- .2 Where the existing car top guard cannot be retained provided a new car top guard as follows:
 - .1 For the safety of the technicians working on the top of the car, provide a car

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top guard consisting of the following.

- .2 Provide car top guard to meet, as a minimum, the requirements of the Code.
- .3 Provide a continuous guard around the sides and rear of the car top.
- .4 Provide a solid kickplate at the bottom of the guard rail extending from the car top to a height of 150 mm to prevent objects on the car top from falling over the side of the car.
- .5 Bolt the car top guard components together so that, if necessary, the guard can be temporarily removed.
- .6 Finish the guard with two coats of rust inhibiting primer and one finished coat of enamel.
- .7 So as to preserve the cab isolation affix the car top guard either to the cab top or to the car sling and frame but not to both.
- .8 If the car top guard is affixed to the car sling provide, where necessary, supports to the cab using vibration isolated mountings so arranged as to preserve the cab isolation.
- .9 If the car top guard is affixed to the cab provide, where necessary, supports to the car sling and uprights using vibration isolated mountings so arranged as to preserve the cab isolation.
- .10 Ensure that the installation of the car top guard does not reduce the overhead clearances to less than allowed by Code.
- .11 Provide a guard to meet the requirements of the regulating authorities.
- .12 Make any necessary submissions to the regulating authorities and obtain approvals of the submissions.

2.59 Car balance

- .1 Statically balance the car so that, at the centre of the travel, with the top guiding means removed, the car hangs in the centre of the rails.
- .2 Arrange the equipment so that there is, in this position, with the guiding means properly adjusted, no force upon the guides.
- .3 Make this test with empty car and car doors closed.

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- .4 Locate and adjust devices such as the compensating devices, travelling cable hangers and cab balancing weights so that the force upon any guide at any point in the travel does not exceed 110 Newtons (25 pounds) with empty car and car doors closed.

2.60 Limit switch dowelling

- .1 After the final limit switches are adjusted and prior to the performance of safety tests and checks by the inspecting authorities, fasten, by throughbolting or dowelling, the final limit switches and final limit switch brackets so as to minimize the possibility of future incorrect adjustment.

2.61 Car ride

- .1 Arrange that the horizontal acceleration front to rear or side to side measured in the car with the elevator travelling, with a load of less than 10 per cent of capacity, from top to bottom and bottom to top does not exceed 0.15 m/s^2 (0.5 ft/s^2) measured between two consecutive points of opposite value.
- .2 Arrange that the vertical acceleration measured in the car with the elevator travelling, with a load of less than 10 per cent of capacity, from top to bottom and bottom to top at contract speed, does not exceed 0.10 m/s^2 (0.3 ft/s^2) measured between two consecutive points of opposite value.

2.62 Painting

- .1 Ensure that machine room and hoistway equipment, except for machined surfaces and non-rusting surfaces, is protected with rust inhibiting primer of a neutral colour.
- .2 Where rust has developed on the existing equipment, brush the surface to the bare metal and re-paint.
- .3 Clean the machine room and elevator pits to be free of debris and miscellaneous items not required in those spaces.
- .4 Clean and paint the machine room floor.
- .5 Clean and paint the machine room walls and ceilings.
- .6 Clean and paint the pit floor.
- .7 Clean and paint the car top.

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2.63 External connections

- .1 Provide a junction box on the external wall of the hoistway at a point to be designated later for connections for such items as telephones, CCTV, lobby panels, monitor systems, to external locations such as the CACF Room.
- .2 Locate this box as instructed and provide clearly marked terminal blocks for the wiring connections.
- .3 Supply the required wiring for the connections from this box to the external locations (provision of external conduit and pulling of wiring by others).

2.64 Travelling cable

- .1 Provide travelling cables with flame-retarding and moisture-resisting outer covers and stranded conductors.
- .2 Supply cables approved for elevator use.
- .3 Provide in the travelling cables:
 - .1 14 AWG (1.5 square mm) conductors for constant current-carrying circuits;
 - .2 18 AWG (0.75 square mm) conductors for signal circuits;
 - .3 20 AWG (0.5 square mm) shielded pair conductors with shielding for telecommunications circuits and data circuits;
 - .4 one RG6/U stranded centre conductor coaxial cable and one pair 18 gauge stranded conductor cable within an overall braided shield for closed-circuit television.
- .4 Provide ten percent additional minimum spare signal and current-carrying wires in each cable.
- .5 Terminate cables using terminal blocks or suitable connectors having identifying numbers to facilitate replacement and service.
- .6 Suspend light weight cables using a wire mesh sleeve to relieve strain in the individual conductors and heavier cables using a steel supporting strand if the suspended weight exceeds 35 kg (seventy-five pounds).

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2.65 Electric wiring

- .1 Provide wiring required to interconnect the new equipment.
- .2 Provide copper wire.
- .3 Provide insulated wiring having a flame retarding and moisture resisting outer cover.
- .4 Where flexible conduit is used, supply it in aluminum.
- .5 Where shielded wire is specified, provide wire of not less than 0.52 mm² area (20 gauge) having individually shielded pairs with 100% shielding.
- .6 Provide colour or number coded wires in multiwire cables.
- .7 Provide waterproof terminal labels.
- .8 Provide stranded field wire except for the individual wires in multiwire cables which may be either stranded or solid.
- .9 Provide travelling cable to connect car operating panels and other car operating devices to the controller in the machine room.
- .10 Provide a minimum of ten percent spare wires throughout the elevator wiring signal runs.
- .11 Provide, if required by the inspecting authorities, in the main machine room or auxiliary machine room, additional main line safety disconnect switches and associated wiring.

3 Execution

3.1 Hydraulic jack hole

- .1 Remove the existing jack together with any backfill or other material that would impede the installation of the new jack.
- .2 After the cylinder is removed, retain it on site to allow inspection, for insurance purposes, by the Consultant (It is anticipated that this would be done within five working days from the time the Consultant is advised that the cylinder is available for inspection).
- .3 Provide any incidental pit floor concrete chipping around the jack hole necessary for the removal of the cylinder.

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- .4 Prior to the conclusion of the project, as necessary patch the concrete floor and seal against water.
- .5 If necessary, provide a pumping truck to drain and remove any water or debris from inside the jack hole.
- .6 Provide equipment and labour as necessary to remove or agitate any soil or slurry that has collapsed into the hole to permit the new cylinder and PVC casing installation.

3.2 Hydraulic: jack installation

- .1 Install the plastic pipe centered on the car sling and plumb within 3 mm (1/8") over its length.
- .2 Backfill as necessary to maintain the plastic pipe in its correct position.
- .3 Install the new jack centered on the car sling and plumb within 3 mm (1/8") over its length.
- .4 Submit a certificate to the Owner outlining the alignment of the installed plastic pipe and jack unit.

3.3 Subsoil decontamination

- .1 After the existing hydraulic jack has been removed, excavate or pump as required:
 - .1 The oil that has leaked from the cylinder;
 - .2 Any contaminated subsoil.
- .2 Dispose of the removed oil and contaminated sub-soil.
- .3 After the decontamination work is complete, demonstrate to the satisfaction of the consultant and the relevant inspecting authorities that the site meets the requirements of the applicable environmental regulations.

3.4 Jack unit test: buried cylinder

- .1 After the installation of the jack unit is complete carry out a test of the cylinder and sleeve in the presence of the Consultant.
- .2 Detect and remove any liquid between the cylinder and sleeve using an air compressor as per the directives from the cylinder manufacturer;

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- .3 Pressure test the system using an air compressor as per the directives from the cylinder manufacturer.
- .4 Carry out this pressure test in the presence of the Consultants at the time of the Consultant's inspection.

3.5 Group control

- .1 Provide a group control dispatching system based on the assignment of calls to an appropriate elevator so as to optimize the elevator system efficiency.
- .2 Assign a hall call to a car based on optimizing the efficiency of the elevator system using the following guidelines:
 - .1 Calculate for each car in the group the total passenger-second penalty if the call were assigned to that car and make the assignment of the call to car so as to achieve the lowest total calculated system passenger-second penalty;
 - .2 At any one floor, without exceeding the average call waiting time (waiting time is the time from the placing of a call until an elevator arrives to handle that call) by more than 50%, assign coincident calls (calls to the same floor) to one elevator;
 - .3 Adjust the dispatch algorithm and parameters so as to minimize system trap time (system trap time is the time from the placing of a call until the person placing that call arrives at the destination and exits the elevator);
 - .4 Adjust the dispatch algorithm and parameters so as to minimize waiting time to the extent possible without increasing the system trap time by more than 10%.
- .3 Arrange that in the event the traffic diminishes to the point that elevators have no assigned calls zone the cars in accordance with the following:
 - .1 Divide the floors served by the elevator group into zones with the main floor being one zone and the other floors comprising a number of zones equal to one less than the number of elevators in the group.
 - .2 Park an elevator without prior assignments (i.e. no car calls, no assigned hall calls and no prior zone assignment) in a particular zone with priority being given to the main floor zone and lower priority to the other zones.
- .4 Provide for system testing as follows:

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- .1 Record in memory for test purposes a preset pattern of calls to be placed over a period of ten minutes such as to verify the operation of the system functions;
- .2 In response to a command from the user run the elevators by injecting these calls into the system;
- .3 Provide as many test patterns as necessary to check and verify all of the dispatching system features;
- .4 At the time the elevators are commissioned run the test patterns and record the results (signature recordings) for reference and comparison to future test results.
- .5 Submit for review details of the system, samples of fixtures and description of operation.

3.6 Operation: call behind response

- .1 If a hall call exists which cannot be answered by a car in its normal line of travel (e.g. a hall call above a down travelling car):
 - .1 Cause another car to be assigned to answer the call;
 - .2 Redistribute the remaining cars as required to service other traffic needs.

3.7 Operation: reduced group

- .1 Should an elevator be taken out of the group automatic operation for any reason, adjust the dispatching system automatically to the new conditions of operation and continue to control the reduced group in substantially the same way as with the full group.

3.8 Operation: delay protection

- .1 Automatically disassociate a car from group service in the event that the car is delayed for more than a given period of time.
- .2 Restore the car automatically to group service when the delay is corrected.
- .3 Arrange that the given period of time be approximately one minute but shall be adjustable from 30 seconds to two minutes.

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3.9 Operation: call response

- .1 Store all hall and car calls in the control memory until answered.
- .2 Cancel a call when it is answered by a car.
- .3 Stop a running car at the first landing for which a car call is registered.
- .4 Stop a running car for a hall call registered for the same direction as the car is travelling, subject to higher priority assignments and to load in the car.

3.10 Operation: dispatch recovery

- .1 If a hall call remains registered for longer than 60 seconds and within that period the cars are not running, dispatch all cars and run without dispatch delay or assignment until all registered hall calls are cancelled.

3.11 Operation: car call anti-nuisance feature

- .1 Arrange the control circuits to cancel all car calls when an unreasonable number of car calls has been registered relative to the number of passengers in the car.
- .2 Prevent nuisance car calls by:
 - .1 Not allowing car calls to be registered below the current position of an up travelling car;
 - .2 Not allowing car calls to be registered above the current position of a down travelling car;
 - .3 Or, by cancelling car calls when the car reverses direction.

3.12 Operation: call initiation

- .1 Control the elevator automatically by buttons in the car, marked to correspond with the respective landings served, and by the call buttons at the landing stations.
- .2 Register a call by momentary pressure of a button.

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3.13 Operation: high & low call return

- .1 Cause the car to proceed to the calls until it has come to the limit of calls placed in the direction in which it is travelling, and having done this, subject to the assignment of the dispatch system, to reverse direction.
- .2 Do not stop the car, except in the case of high and low return, for hall calls in the opposite direction to the direction of the car.

3.14 Operation: direction reversal

- .1 Cause a car without registered car calls, arriving at a floor where both up and down hall calls are registered, to initially respond to the hall call in the direction that the car was travelling.
- .2 If, subsequent to the stop at this landing, there are no car or hall calls registered such as to require immediate travel in the same direction as before stopping at that landing, cause the car to close its doors, immediately reopen them and respond to the hall call in the opposite direction.

3.15 Operation: fault recovery

- .1 Provide a recovery circuit arranged to take the elevator at low speed to the next floor in the event of an overspeed condition, overload trip, or other similar fault condition.
- .2 Do not implement the recovery circuit if the movement of the car would endanger the passengers in the car.
- .3 Provide a circuit separate from the normal speed control circuits, with power derived through separate controls and limited in power by resistance or fixed devices to an appropriate low level.
- .4 Do not use, in this circuit, any solid state or other device which could fail in a mode that would allow an increase in applied power.
- .5 Upon arrival of the car level at the next floor, cause the doors to open and remain open, and turn off the car lights.
- .6 Leave the elevator in this state until the fault is corrected and the car restored to service.

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3.16 Operation: independent service

- .1 Provide independent service.
- .2 On independent service:
 - .1 Remove the car from the automatic supervisory control system;
 - .2 Arrange the circuits so that the car does not respond to hall calls;
 - .3 Render the hall lanterns (if provided) inoperative;
 - .4 Cause the car to park with its doors open;
 - .5 Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up;
 - .6 Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move;
 - .7 Render inoperative the normal door protective devices;
 - .8 Arrange the controls so that the attendant can select direction of travel;
 - .9 Cancel all registered car calls when the direction reverses or a car call is answered.
 - .10 Arrange the independent service operation so that it does not override security features or security systems.

3.17 System clock

- .1 Where operations or functions are subject to clock control or require clock input, provide a solid state clock.
- .2 Provide, in the machine room or at the central control console, means to indicate the current clock time.
- .3 Provide, in the machine room or at the central control console, means to readily reset the clock time.
- .4 Provide crystal regulation of frequency and voltage control adequate to maintain the time within an accuracy of plus or minus five seconds per month.
- .5 Provide software to automatically adjust the time for changes from standard to

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daylight saving time and from daylight saving time to standard time.

- .6 Provide battery back-up to maintain for a period of at least 24 hours accurate clock time in the event of power loss.

3.18 Door protective device by-pass (nudging)

- .1 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to close slowly under reduced power and operate a buzzer in the car panel as a warning to the person obstructing the door.
- .2 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.

3.19 Door open pause time

- .1 Arrange the circuits so that when the car is stopped in response to a hall call the doors remain open a predetermined length [approximately 3 seconds for an elevator whose entrances are within 3 metres (10') of the hall push button and approximately 4 seconds for an elevator whose entrances are further than 3 metres (10') from the hall push button].
- .2 Arrange that this predetermined length of time is reduced to approximately 0.7 seconds if a person moves through the entrance (as indicated by the actuation of the door protective device).
- .3 Unless otherwise specified (e.g. to allow for advance hall lantern warning), arrange the circuits so that when the car is stopped in response to a car registered call the doors remain open a predetermined length of time (approximately 1 second).
- .4 Make the times separately adjustable over a range from 0.25 seconds to 15 seconds.
- .5 Arrange the circuits so that the door open pause time is cancelled if a car call button is pressed or the door close button is pressed.

3.20 Operation: door protective device

- .1 Arrange the door protective device so that, should it detect a person or any object in its path, at any point during the door closing operation, it will cause the doors to return to the open position.
- .2 Adjust both the detection device and the door operation so that an object or person in the way of the door will cause the doors to reverse without the door panel of

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either hall or car doors actually striking the object or person.

3.21 Deadweight change

- .1 Weigh the car and the counterweight (where applicable) so as to determine the cumulative deadweight change (The cumulative deadweight change is the sum of previous deadweight changes and the current proposed weight change) where any of the following apply:
 - .1 Where the cumulative deadweight increase of the car is more than 11 kg (25 lbs).
 - .2 Where there is evidence of a previous cab modernization and the prior weight changes were not recorded.
 - .3 Where there is doubt as to the accuracy of the car crosshead data tag.
- .2 If the cumulative deadweight increase of the car is more than 11 kg (25 lb):
 - .1 Record the car and counterweight weight change on an Auxiliary Data Tag;
 - .2 Post the Auxiliary Data Tag on the car crosshead.
- .3 If the cumulative deadweight change is less than 115 kg (255 lb) and less than 5% of the weight of the originally installed elevator car plus elevator capacity:
 - .1 Record the car and counterweight weight change on an Auxiliary Data Tag;
 - .2 Make the counterweight equal to the weight of the complete elevator car plus between 40 percent and 45 percent of the contract load;
 - .3 Post the Auxiliary Data Tag on the car crosshead.
- .4 If the cumulative deadweight change is greater than 115 kg (255 lb) but less than 5% of the weight of the originally installed elevator car plus elevator capacity:
 - .1 Perform an engineering assessment of the installation with regard to the equipment which may be affected by the weight change including machine and sheaves, car and counterweight frame, buffers, traction and overbalance, lift ropes, plunger strengths and working pressure, hydraulic components under pressure and safeties;
 - .2 Record the car and counterweight weight change on an Auxiliary Data Tag;
 - .3 Make the counterweight equal to the weight of the complete elevator car

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- plus between 40 percent and 45 percent of the contract load;
- .4 Post the Auxiliary Data Tag on the car crosshead.
- .5 If the cumulative deadweight change is greater than 5% of the weight of the originally installed car plus the elevator capacity:
 - .1 Perform a full engineering assessment of the installation with regard to all equipment which may be affected by the weight change including machine and sheaves, car frame and counterweight, buffers, traction and overbalance, lift ropes, plunger strengths and working pressure, hydraulic components under pressure, safeties, car frame and platform, capacity and loading, governors, guide rails, beams, supports and foundations;
 - .2 Record both car and counterweight changes on the Auxiliary Data Tag;
 - .3 Make the counterweight equal to the weight of the complete elevator car plus between 40 percent and 45 percent of the contract load;
 - .4 Post the Auxiliary Data Tag on the car crosshead.
- .6 Provide an Auxiliary Data Tag to meet the requirements of latest edition of the Code.
- .7 Enter, as a minimum, the following data on the Auxiliary Data Tag:
 - .1 The measured car weight prior to the alteration;
 - .2 The weight change of the car and counterweight;
 - .3 The year and month of the alteration;
 - .4 The name of the contractor who performed or supervised the work.
- .8 For traction elevators, test the traction relations in accordance with the latest edition of the B44 code.

3.22 Noise level: door operation

- .1 Arrange the equipment so that the noise level, as measured within the cab, does not exceed 60 decibels at any time during a full door open, door close and door reversal cycle.
- .2 Initiate the door reversal by triggering the door protective device.

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- .3 Measure the noise level using an ANSI type 2 sound level meter on the "A" scale with an "F" response.

3.23 Noise level: cab

- .1 Arrange that, with the elevator travelling from one end of the hoistway to the other, the noise level as measured within the elevator cab does not vary by more than 3 decibels.
- .2 Measure this noise level with an ANSI type 2 sound level meter on the "A" scale with an "F" response.

3.24 Cab fan: operation

- .1 Arrange that there is no discernible vibration in the car with the fan operating.
- .2 Arrange that the noise level developed by the fan, measured in the car with the fan running, does not exceed 55 db.

3.25 Noise level: control and machine room

- .1 Design the equipment so that the noise level with the elevator running, as measured by a meter positioned in the centre of the control and machine rooms, does not exceed 80 decibels.
- .2 Measure this noise level using an ANSI type 2 sound level meter on the "A" scale with an "F" response.

3.26 Levelling

- .1 Cause the car to stop automatically at floor level, without overshoot, regardless of load or direction of travel so that the car sill is level, within 6 mm (1/4"), with respect to the hoistway sill.
- .2 When the elevator cab is stopped at a floor, correct for over travel or under travel or movement of the cab away from the floor, by returning the car imperceptibly to floor level.

3.27 Speed control: hydraulic

- .1 Provide a speed control system of the hydraulic-electric type in which control is accomplished by varying the oil flow to and from the hydraulic jack.
- .2 Design and adjust the equipment so that the average acceleration over the period of constant acceleration is 0.6 m/s^2 (2.0 ft/s^2) plus or minus 10%.

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- .3 Design and adjust the equipment so that the average change in acceleration (jerk) is 1.8 m/s^3 (6.0 ft/s^3) plus or minus 10%.
- .4 Design and adjust the equipment so that the rated speed is maintained with an accuracy of 5%.

3.28 Test data form: hydraulic

- .1 After completion of the Work, and prior to Substantial Performance, submit a test data form certifying that the unit is complete and ready for inspection.
- .2 Arrange that this form be signed by the person responsible for the performance of the Work.
- .3 Include a check list of the items in the specifications as well as other performance data such as door times, operating times, starting and running currents and voltages, operating pressures, slowdown distances, valve settings, and, in general, settings of any adjustable devices.
- .4 List on this form safety devices, together with their settings and indicate as to whether they have been checked and adjusted.
- .5 Submit a soft copy of the data form in PDF (Acrobat Reader) format.

3.29 Operating time

- .1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed the time shown in the data table.
- .2 Measure this time under the following conditions:
 - .1 A typical floor height of less than 4000 mm (13');
 - .2 Floor levelling accuracy of $\pm 6 \text{ mm}$ (1/4");
 - .3 Start time when the fully opened doors begin to close;
 - .4 Stop time when the car is stopped level with the next floor and the car and hall doors are 800 mm (32") open;
 - .5 Time measured with full load in the car and in both directions of travel;
 - .6 Power door operation for the hall and car doors conforms to the elevator code requirements.

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- .3 Adjust the equipment so that the operating time is compatible with dependable, consistent operation without undue wear or excessive maintenance and so that this operating time can be readily maintained over the life of the elevator installation.
- .4 Adjust the equipment so that, with the control functioning so as to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride.

3.30 Emergency power operation: automatic

- .1 The supplier of the emergency power system (provided by others) will arrange that:
 - .1 The emergency power source will provide sufficient power to run one elevator per group at its contract speed and capacity;
 - .2 The emergency power will be provided on the same lines and the same disconnect as the normal power;
 - .3 Four wires will connect two auxiliary contacts of the emergency power transfer switch to the elevator controllers of the group;
 - .4 One contact ('Emergency Contact') will on normal power make a closed circuit and on emergency power present an open circuit;
 - .5 The other contact ('Delayed Contact') will present a closed circuit except for an adjustable period of time (5 to 50 seconds adjustment, set initially at 15 seconds) prior to power supply transfer in either direction - from normal to emergency or from emergency to normal.
- .2 Arrange that when the 'Emergency Contact' is open the signal light marked "ELEVATOR EMERGENCY POWER" is illuminated.
- .3 Arrange that when the 'Delayed Contact' is open, all cars stop.
- .4 Arrange that when the 'Emergency Contact' is open and the 'Delayed Contact' is closed:
 - .1 All cars are automatically brought to the main floor sequentially one at a time;
 - .2 Any car delayed by a malfunction is by-passed;
 - .3 After all cars of the group are at the main floor with their doors open, an elevator as selected by a manual switch will run normally answering hall

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and car calls: this elevator to have its main floor hall lantern (if provided) illuminated;

- .4 The normal safety devices including door open buttons, safety edges and door protective devices, remain operational.
- .5 Provide the indicators and switches in the hall station and elsewhere as necessary for the emergency power operation.
- .6 Arrange that, when running on emergency power, the elevator does not generate harmonics that will cause a mis-operation of the emergency power supply when accelerating, running or decelerating.
- .7 Provide switches and indicators in the hall and car stations as required by Code.

3.31 Firefighters' Emergency Operation: manual recall

- .1 Provide Firefighters' Emergency Operation including:
 - .1 Phase I manual Emergency Recall Operation;
 - .2 Phase II Emergency In-Car Operation.
- .2 Provide switches and indicators in the hall and car stations as required by Code.

END OF SECTION

Elevator Modernization

Section 14220 Elevator Decommissioning

1 General

1.1 General requirements

- .1 Conform to Section 14200.

1.2 Type

- .1 Decommissioning of a single winding drum freight elevator.

2 Products & Execution

2.1 Decommissioning

- .1 Remove the elevator from the power source and arrange to have the fuses removed from the main line disconnect.
- .2 Lock out the main line disconnect as per the prevailing codes.
- .3 Seal the main line disconnect in accordance with the prevailing codes.
- .4 Clean out any spare parts from the machine room and transfer all paperwork to the Owner.
- .5 Retain the shoring posts at the main floor.

2.2 Hoistway door safety retainers: entrances above the bottom floor

- .1 Provide safety retainers on both sides of vertically bi-parting doors, for entrances above the bottom floor served, to retain the closed door panel in position if the primary guiding means fail.
- .2 Provide retainers that will prevent the displacement of the door panel by more than 20 mm (0.8") when the door panel is subjected to a force of 5 000 N (1130 lbf) applied towards the hoistway at right angles to the panel over an area of 300 mm by 300 mm (12" by 12") at the centre of the panel.
- .3 Provide retainers that will withstand, without detachment or permanent deformation, a force of 1 000 N (225 lbf) applied at any point along the height of the door panel together with an additional concurrent force of 1 100 N (250 lbf) applied at right angles to the door at the centre of the panel over an area of 300 mm by 300 mm (12" by 12").

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- .4 Arrange that the retaining means are not involved in the guiding of the panel and are not subjected to wear or stress during normal door operation.

2.3 Entrances

- .1 Bolt shut the hoistway doors, from inside the hoistway, above the bottom floor served.

2.4 Dismantling: full

- .1 Remove and transfer to the Owner equipment that the Owner elects to retain for the Owner's use.
- .2 Remove and take possession of all elevator equipment from the hoistway, with the exception of the guide rails, including, but not limited to, buffers and pit steel, cab, counterweight, deflector sheaves, governor, wire rope, wiring, conduit and wiring raceways.
- .3 Remove and take possession of all elevator equipment from the machine room including, but not limited to, the controller, machine, machine support beams, motor, deflector sheaves, governor, wire rope, wiring, conduit and wiring raceways.
- .4 Remove and take possession of all elevator equipment from the hall including, but not limited to, fixtures, wiring, conduit and wiring raceways.
- .5 Pull all wiring back to its original source and remove (i.e. disconnects).
- .6 Where requested by the Owner, provide metal cover plates for holes in the machine room floor and for fixture back-boxes.

END OF SECTION
END OF SPECIFICATION