

Canadian Space Agency - David Florida Laboratory  
3701 Carling Avenue, Building 65  
Ottawa, Ontario

specifications  
elevator

Elevator Modernization

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2016-01

## Elevator Modernization

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### Section 14200 General

#### 1 General

##### .1 Scope

- .1 Provide labour, materials, products, equipment and services necessary for the modernization of one buried hydraulic freight elevator designated EL3 (large freight) located at the Canadian Space Agency - David Florida Laboratory, 3701 Carling Avenue, Building 65, Ottawa, Ontario, in accordance with Section 14210 of these Specifications.
- .2 Commissioning of the elevator including provision of project closeout documentation and detailed testing, adjustment and verification of elevator operations prior to turnover 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.

##### .2 Maintenance service under this contract

- .1 Provide full maintenance service for the equipment from contract award 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 - Amendment 261/13-r1 and the PWGSC Long Term Maintenance Contract.
- .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.
- .7 Schedule work during regular trade working hours, with the Departmental Representative.



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- .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 at the end of each day.
- .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.

### **.3 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.
- .7 Where maintenance and testing frequencies in the Maintenance Control Program are less than these specifications, these specifications take precedence.

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- .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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### **.4 Definitions of terms**

- .1 The term "Owner", as used herein, refers to Canadian Space Agency (CSA).
- .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 CAN/CSA-B44-10 Safety Code for Elevators and Escalators with updates and including Non mandatory 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.

### **.5 DFL Projects General Notes & Procedures**

- .1 Abide by the CSA "DFL Projects General Notes & Procedures" document as it applies to contractors (attached as Appendix A).
- .2 Where there is a conflict between the CSA "DFL Projects General Notes & Procedures" document and these specifications the "DFL Projects General Notes & Procedures" document takes precedence.

### **.6 Contract documents**

- .1 Execute the work in accordance with the Owner's contract document, any supplemental conditions and these specifications.
- .2 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.

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### **.7 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.

### **.8 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.

### **.9 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.

### **.10 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.

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### **.11 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.

### **.12 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.

### **.13 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.

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- .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.

### **.14 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.

### **.15 Acknowledgments**

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

### **.16 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.

### **.17 Information upon contract award**

- .1 Provide the following information, where relevant, at the pre-construction meeting to be coordinated 5 (five) days after contract award:
  - .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;

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- .6 Brochures, descriptions and manuals (where applicable) for the major 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.

### **.18 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.

### **.19 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 and Owner approval, 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;
  - .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;

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- .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.
- .20 Operation by persons with physical disabilities**
  - .1 Ensure that controls and fixtures comply with Appendix E of the Code.
- .21 Fixture type: vandal proof**
  - .1 Provide, unless otherwise indicated in the Specifications or Drawings, all signal fixtures, such as push buttons, position indicators, et cetera, of the vandal resistant type.
  - .2 Provide, unless otherwise indicated in the Specifications or Drawings, signal fixtures with red illumination.
  - .3 Submit, with the proposal, samples or illustrations of those types available.
  - .4 Submit, for review, shop drawings showing the design and finish.
- .22 Door equipment: Peelle**
  - .1 Provide, unless otherwise indicated in the Specifications or Drawings, door equipment and door operation equipment manufactured by Peelle.
  - .2 Submit, for review, shop drawings showing the design and finish.



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### **.23 Equipment: heavy-duty**

- .1 Provide equipment designed for continuous operation under conditions of heavy traffic and loading.
- .2 Provide major components designed and manufactured to provide a lifespan of over twenty-five years in the above conditions.

### **.24 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 and pay for a safety inspection of the equipment by a government authority or, if that is not available, by a recognized independent private professional inspection organization.
- .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;
  - .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.

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- .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.

### **.25 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 in which the costs will be the responsibility of the contractor.
- .4 Give sufficient advance notice in writing so that the Consultant can arrange for his representative to witness these inspections.

### **.26 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.

### **.27 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.

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

### **.28 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.

### **.29 Regular hours of work**

- .1 Regular hours of work are from 07:00 to 15:30 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 as selected by the Owner and include in your submission the costs for such overtime work.

### **.30 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.

### **.31 Overtime provisions**

- .1 Include overtime labour for work necessary to complete the job, such as emergency power testing, fire alarm testing, wiring of hall stations into dispatchers and work that will cause a major disruption of service to the building.

### **.32 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

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- cost of the overtime plus twenty-one percent for all miscellaneous charges such as overhead, inefficiency, et cetera.
- .2 The added cost shall be the difference between the actual overtime cost and actual straight time cost.
  - .3 The actual cost shall be that amount that the Contractor is required to pay to the Contractor's employees on the job site together with any amounts that the Contractor is required to pay on behalf of the employees in contributions to various fringe benefits.
  - .4 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.
  - .5 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.
  - .6 If the procedures as set out above are not followed, assume the costs of the time worked.

### **.33 Completion schedule**

- .1 Submit at the pre-construction meeting, a detailed completion schedule including equipment delivery times and anticipated completion date.
- .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 week showing the progress being made and the percentage of the job completed;
  - .3 One week advance notice for inspection by the Consultant.
- .3 Schedule a job site meeting with the Owner every two weeks during the modernization period.

### **.34 Claims for extra cost**

- .1 Give 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.

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- .2 No such claim shall be valid unless so made and authorized in writing by the Owner.

### **.35 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.
- .2 When the above grounds are removed, payment will be made for amount withheld.

### **.36 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.

### **.37 Labour laws**

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

### **.38 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.

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- .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 at the times specified by the Owner.

### **.39 Orientation session**

- .1 All personnel must attend a mandatory Owner briefing before starting any work and adhere to the information presented at all times. Any personnel who did not attend the briefing will not be allowed to work on site - no exceptions.

### **.40 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.
- .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 one dedicated and approved site supervisor to the work which has to be present at all times while work is being performed. Workers and sub-trades will not be allowed to work without the approved, designated site supervisor being present. This supervisor to be responsible for technical communications with the Owner and the Consultant.

### **.41 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.

## Elevator Modernization

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- .3 Remove and transfer to the Owner equipment that the Owner elects to retain for the Owner's use.

### **.42 Equipment moving**

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

### **.43 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.

### **.44 Removal of rubbish**

- .1 Remove rubbish after each work day, 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.

### **.45 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.
- .4 If changes are subsequently made to the wiring or control, supply an additional two sets of marked-up prints of the schematics and field wiring diagrams showing the changes.

## Elevator Modernization

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### **.46 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.

### **.47 Trade marks**

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

### **.48 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.

### **.49 Measurements**

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

### **.50 Operating environment**

- .1 Provide material and equipment to function normally within the requirements of the specifications when the ambient temperature is between 3.5 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%.
- .3 Provide material and equipment to function normally and within the requirements of the specifications when the supply voltage is within minus 15% and plus 10% of the nominal voltage and the frequency is within 5% of the nominal frequency.

### **.51 Pre-inspection check list**

- .1 Upon completion 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.



## Elevator Modernization

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- .2 Submit this initialled copy of the Specifications to the Consultant prior to requesting an inspection by the Consultant.

### **.52 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.

### **.53 Materials and workmanship**

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

### **.54 Existing drawings**

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

### **.55 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.

### **.56 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.

### **.57 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.

## Elevator Modernization

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### **.58 Maintenance manual**

- .1 Supply to the Owner prior to the Substantial Performance inspection, a maintenance manual in PDF format.
- .2 Incorporate in the manual a description of the controller user interface, fault and error codes, troubleshooting and diagnostic procedures, methods of use and the adjustment of programmable parameters together with their settings at the time of final adjustment.

### **.59 Operation manual: elevator**

- .1 Supply to the Owner prior to the Substantial Performance inspection, a manual describing in detail the operation of the equipment including special features, dispatching sequences, and such items as intercom systems and security systems.
- .2 Set out in step by step form the operation for special features such as Firefighters' Emergency Operation, Independent service and Emergency Power service.
- .3 Supply, as part of the manual, as built diagrams and drawings of operating panels (e.g. car panels, central control consoles) with descriptions of the function of switches and indicators.
- .4 Supply one copy of the manual in PDF format on digital media acceptable to the Owner.

### **.60 Technical seminar**

- .1 At 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.

### **.61 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.

## Elevator Modernization

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- .3 Paint the machine room floor.

### **.62 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 direction of the longer surface dimension.

### **.63 Key switches**

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

### **.64 Bilingual markings and announcements**

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

### **.65 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.

### **.66 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.

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### **.67 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.

### **.68 System log error codes**

- .1 Provide to the Owner a PDF document listing system error codes complete with a full English description of the meaning of each code.
- .2 Incorporate as part of the document a description of the procedure for accessing and resetting the codes and demonstrate this procedure to the Consultant.

### **.69 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.

### **.70 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.

## Elevator Modernization

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- .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.

### **.71 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.

### **.72 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.

### **.73 Work under division 03**

- .1 Work required in conjunction with the installation and included in Division 03 (Concrete) will consist of the following items:
  - .1 Where necessary, supports for the sill support angles, flush with the inside hoistway wall, a minimum of 150 mm (6") in depth, capable of sustaining a minimum unit load equivalent to the capacity of the elevator.

### **.74 Work under division 04**

- .1 Work required in conjunction with the vertical transportation work and included in Division 04 (Masonry) will consist of the following items:
  - .1 When necessary, grouting under hoistway sills.

### **.75 Work under division 09**

- .1 Work required in conjunction with the installation and included in Division 09 (Finishes) will consist of the following items:
  - .1 Cutting and patching of machine room walls and floors and around hall fixtures and hall door frames as needed.

## Elevator Modernization

### .76 Work under division 15

.1 Work required in conjunction with the installation and included in Division 15 (Mechanical) will consist of the following items:

.1 Heating and cooling of the machine room 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 EL3 (large freight)	5.1	17250

### .77 Work under division 16

.1 Work required in conjunction with the installation and included in Division 16 (Electrical) will consist of the following items:

.1 A lockable power supply, with an isolated ground, capable of supplying for the elevator the following starting and running currents in amperes (based on a 600V power supply):

Full load up currents	power supply (V)	starting amps	running amps
Elevator EL3 (large freight)	600	96	38

.2 An emergency power supply sufficient to start and run the elevator at full rated speed and capacity:

.1 The emergency power will be provided on the same lines and the same disconnect as the normal power;

.2 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;

.3 Four wires will be provided to connect two auxiliary contacts of the emergency power transfer switch to an elevator controller of each group;

## Elevator Modernization

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- .4 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;
- .5 The cab lights to be so arranged as to be functional on emergency power.
- .3 In the elevator machine room, one 15 A 120 V, single phase circuit breaker, located adjacent to the lock side of the control room door, to power the cab interior duplex GFCI receptacle (if one is provided).
- .4 Replace existing duplex receptacles in the elevator machine room and hoistway with GFCI receptacles.
- .5 In the machine room, 2/28 W T5 fluorescent (or LED) lights (with guards) 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 within the controller, the power for the lighting circuit being derived from the emergency power supply.
- .6 In the elevator pit, protected lights, controlled by a light switch located adjacent to the pit entrance, located clear of elevator equipment to give a minimum illumination of 160 lux at pit level, the power for the lighting circuit being derived from the emergency power supply.
- .7 An active telephone line run to the elevator machine room (this may already be in place).
- .8 Where needed, conduit and pulling of wire (wiring to be supplied 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.

## Elevator Modernization

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### **2 Separate prices**

#### **.1 Separate price submission requirements**

.1 Submit prices to provide the following:

#### **.2 Cab shell: Aluminum**

.2 Provide an aluminum cab shell, reinforced for rigidity.

#### **.3 Maintenance service: five years**

.3 Provide full maintenance service for equipment for a period of five years beginning at the end of the maintenance included in the contract.

.4 This maintenance includes systematic examination, cleaning, lubricating and adjustment of all elevator equipment.

.5 All inspections and tests are to be carried out in accordance with the CSA Standard B44.2-10 and Elevating Devices Code Adoption Document - Amendment 261/13-r1 and the PWGSC Long Term Maintenance Contract.

.6 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.

.7 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.

.8 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.

.9 Schedule work during regular trade working hours, with the Departmental Representative.

.10 The Departmental Representative shall be completely informed on a continuing basis once an elevator is out of service .

.11 Include 24 hour call-back service due to equipment stoppage or malfunction at all times at no additional cost.



## Elevator Modernization

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- .12 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.
- .13 Garbage shall be removed at each examination.
- .14 Adjust control system for optimum operation towards the end of the maintenance period.
- .15 Dress maintenance technicians in uniforms, register with designated personnel.
- .16 A licenced elevator mechanic with experience in maintaining these types of equipment shall maintain these devices.
- .17 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.

#### **.4 Freight door equipment and operation: enhanced commissioning**

- .18 Prior to turnover of the elevator, arrange for a dedicated elevator adjustor and a Peelle technical representative to be present on-site together for a minimum of two 8 hour work days (i.e. 16 hours total) to perform a final review, testing and enhanced commissioning of the freight elevator door equipment.
- .19 Enhanced commissioning includes, but is not limited to, the following:
  - .1 A final review of the door equipment.
  - .2 Testing of the door equipment.
  - .3 Adjusting of the door equipment.
  - .4 A minimum of 50 test cycles consisting of door open, door close, a single run to an adjacent floor, door open, door close, and a return run to the main floor.
  - .5 A minimum of 5 test cycles consisting of a simulated single 12,000 lb load moved onto the elevator, a run to an adjacent floor, removal of the single 12,000 lb load from the elevator then the return of the elevator to the main floor.

END OF SECTION

## Elevator Modernization

### Section 14210 Elevator Modernization

#### 1 General

##### .1 General requirements

.1 Conform to Section 14200.

##### .2 Type

.1 Modernize existing Elevator EL3 (large freight).

##### .3 Data

CSA David Florida Labs, Elevator EL3 (large freight)			
Item	Existing		Modernization
number of units	1		no change
designation	EL3 (large freight)		no change
licence number	33123		no change
elevator type	hydraulic		no change
application	freight		no change
loading class	industrial truck		no change
rated speed (m/s, fpm)	0.13	25	no change
capacity (kg, lb)	7257	16,000	no change
motor power (kW, HP)	22.3	30	new
operation	single automatic		no change
motor location	submerged		new
pump type	IMO		new
jack type	buried, direct-acting		new
cylinder diameter (mm, ")	255	10	new
corrosion protection	yes		new; PVC
drive type	wye-delta		new; soft start
control system	relay-based		new; microprocessor
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	none		new

Elevator Modernization

CSA David Florida Labs, Elevator EL3 (large freight)			
Item	Existing		Modernization
front entrances	B, 1		no change
rear entrances	none		no change
door type	vertical bi-parting		new; Peelle
hoistway door fire resistance	1.5 h		no change
entrance width (mm, “)	3660	144	no change
entrance height (mm, “)	3050	120	no change
entrance markings	none		new
cab width (mm, “)	3660	144	no change
cab depth (mm, “)	5300	209	no change
cab clear height (mm, “)	3650	143	no change
car gate restrictor	none		new
door reopening device	safety edge		new; infrared
door operator	Peelle		new; Peelle closed loop
interlocks	Peelle		new; Peelle
main car station	provided		new
auxiliary car station	none		no change
verbal annunciation	none		floor passing tone
car position indicator	none		new; digital
cab emergency lighting	provided		new
cab communication	handset telephone		new; hands-free
car call security	none		provisions
hall call security	none		no change
hall stations (typical)	provided		new
hall stations (main floor)	provided		new
hoistway access switches	provided		new
hoistway unlocking devices	provided		new
cab ventilation	none		no change
cab finishes	painted steel shell		new; SS finishes
hall door finish (typical)	painted steel		new; painted steel
hall door finish (main)	painted steel		new; painted steel
car gate	expanded mesh		new; solid SS
cab bumpers	wood		new; rubber/plastic
hall sills (typical)	cast iron		new; stainless steel
hall sills (main)	cast iron		new; stainless steel
hall lanterns	none		no change

### Elevator Modernization

CSA David Florida Labs, Elevator EL3 (large freight)		
Item	Existing	Modernization
in-car lanterns	none	no change
hall position indicator	none	new; in hall station
lobby panel	none	no change
CACF panel	none	no change
central control monitor	none	no change
car top inspection station	provided	new
load weighing device	none	new
car guiding	sliding shoes	no change
guide rails	T-rails	no change
emergency recall	one	manual recall
firefighter's operation	none	provide
emergency power	generator	new
car top railing	none	no change
equipment guarding		new

#### .4 Dimensions

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

#### 2 Products

##### .1 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 babbitt-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.

## Elevator Modernization

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- .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 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");
  - .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.

## Elevator Modernization

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### **.3 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.

### **.4 Buffer channel**

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

### **.5 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.

### **.6 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.

### **.7 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.

## Elevator Modernization

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- .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.
- .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.

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- .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.

### **.8 Hydraulic fluid: biodegradable**

- .1 Provide hydraulic fluid of the non-toxic, biodegradable type having a minimum viscosity index of 150 measured using the ASTM D2270 method.

### **.9 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.



## Elevator Modernization

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- .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.
- .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.

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- .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%.

### **.10 Hydraulic piping**

- .1 Provide pipes and fittings to connect the power unit to the jack unit.
- .2 Provide new Victaulic couplings.

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- .3 Seal connections adequately to prevent any leakage or seepage of oil.
- .4 Provide pipe of minimum 50 mm (2") nominal size to reduce oil velocity, noise and vibration.
- .5 Run the oil lines above ground and suspend the oil lines with isolating hangers to reduce sound transmission.
- .6 Cut and patch for the new hydraulic piping and provide fire-stopping as necessary.

### **.11 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.

### **.12 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:
  - .3 Up direction relays and contactors to be de-energized.
  - .4 Automatic registration of a bottom floor call to bring the car to the lowest landing where it will remain with its doors open.
  - .5 No response to any further hall calls or car calls until the main line switch has been opened and closed again.

### **.13 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.

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- .2 Design the unit for a minimum 2800 kilopascals (400 psi) working pressure and provide easy access for cleaning.

### **.14 Hydraulic: silencing devices**

- .1 To reduce any air borne noise, enclose the power unit on all four sides with sheet steel panels combined with 20 mm (3/4") suitable sound-deadening material. 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.
- .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.

### **.15 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.

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- .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.
- .16 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 to act to stop the elevator, the elevator parks at the terminal landing until the system is checked by a maintenance technician.
- .17 Generic controls**
- .1 Provide generic controls from MCE, GAL or JRT.
  - .2 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.
- .18 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.

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- .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.

### **.19 Computing devices**

- .1 Where computing devices are used, such as micro-processors or mini-computers, along with associated devices, design to the following requirements:
- .2 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;
- .3 Provide the control program on read-only-memory with spare capacity to allow for future programming modifications and extensions;
- .4 Provide crystal regulation of frequency;
- .5 Provide for separate regulated power supplies to serve each micro-processor system.

### **.20 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.

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- .2 Design and adjust the equipment so that the average acceleration over the period of constant acceleration is 0.6 metres per second per second (2.0 f/s/s) plus or minus 10%.
- .3 Design and adjust the equipment so that the average change in acceleration (jerk) is 1.8 metres per second per second per second (6.0 f/s/s/s) plus or minus 10%.
- .4 Design and adjust the equipment so that the rated speed is maintained with an accuracy of 3 percent.

### **.21 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.

### **.22 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.

### **.23 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  $\pm 2.5$  mm ( $\pm 0.1$ ").
- .4 Arrange the elevator controls so that the output from this device is read at least every 5 ms.

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

### **.24 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 Arrange the pump to return a fixed amount of oil to the tank each time it is activated and provide an activation counter so that the amount of oil that has been pumped to the tank can be easily calculated.
- .3 Clearly indicate on the scavenger pump the fixed amount of oil that is returned to the tank each time the pump is activated.
- .4 Provide a reset button for the activation counter to return the count to zero.
- .5 Adequately filter the oil returned by the scavenger pump.
- .6 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.
- .7 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.
- .8 Provide fire-resistant tubing for the scavenger pump oil line.

### **.25 Overspeed valve**

- .1 Provide an overspeed valve in the elevator pit.
- .2 Use Victaulic couplings to connect the valve in the oil line.



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- .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.

### **.26 Hydraulic pit shut-off valve**

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

### **.27 Entrance installation: freight**

- .1 Assume undivided responsibility for the entire installation of the entrances.
- .2 Handle, store, protect, install the entrances and all associated equipment.
- .3 Set door frames in perfect alignment with the elevator car platform.
- .4 Set frames and sills in place prior to building walls.
- .5 Install frames within 1/16 inch of plumb and sills within 1/16 inch of level over the entrance width.
- .6 Provide vertical channel supports securely fastened at the sill and at the floor beam above.
- .7 Securely fasten the sills to the building structure by means of a support angle or substantial brackets.

### **.28 Entrances: bi-parting**

- .1 Provide elevator entrances consisting of frames, stainless steel sills, brackets, toe guards, and doors with guides, bumpers, and all other items necessary for a complete installation.

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- .2 Provide vertical sliding counter-balanced bi-parting hoistway doors.
  - .3 Provide replaceable panels made of not less than 1.9 mm (14 gauge) sheet steel.
  - .4 Provide a flexible astragal in the lower edge of the upper door section.
  - .5 Provide structural channel frames with side members extending from the landing to underside of floor beam above.
  - .6 Provide 6 mm (1/4") minimum stainless steel sills with 70 mm (2-3/4") by 90 mm (3.5") minimum angle iron nosing on the hoistway side.
  - .7 Securely fasten the sills to the building structure by means of a support angle or substantial brackets.
  - .8 Set frames and sills in place prior to building walls.
  - .9 Vertically align the door guides to each other and the rails with a tolerance of 1.5 mm (1/16").
  - .10 Install sills within 1.5 mm (1/16") of level over the entrance width.
  - .11 Finish doors and frames in enamel.
- .29 Door equipment: power operated vertical bi-parting**
- .1 Provide hall doors including tracks, interlocks, door closers, door operators, and related devices necessary for the correct operation of the doors and car gates.
  - .2 Provide hoistway doors of the flush type, of no less than 1.9 mm (#14 gauge), all steel construction, and counterbalanced suitably.
  - .3 Open the car gate and hoistway door sequentially, the hoistway door first and then the car gate when the hoistway door is 2/3 open.
  - .4 Close the car gate and hoistway door sequentially, the car gate first and then the hoistway door.
  - .5 Arrange that the movement of the doors be checked at both limits of travel.
  - .6 Design all door equipment and associated components for a minimum of noise.

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- .7 Design the doors such that, in the event that the power door mechanism becomes inoperative, the doors can be opened manually without excessive effort.

### **.30 Entrance installation: freight**

- .1 Assume undivided responsibility for the entire installation of the entrances.
- .2 Handle, store, protect, install the entrances and all associated equipment.
- .3 Set door frames in perfect alignment with the elevator car platform.
- .4 Set frames and sills in place prior to building walls.
- .5 Install frames within 1/16 inch of plumb and sills within 1/16 inch of level over the entrance width.
- .6 Provide vertical channel supports securely fastened at the sill and at the floor beam above.
- .7 Securely fasten the sills to the building structure by means of a support angle or substantial brackets.

### **.31 Entrance: fire rating**

- .1 Provide entrances bearing a 1.5 hours fire rating approved by authorities having jurisdiction.
- .2 Provide a closure, including interlock mechanism and associated wiring, capable of operating for a period of at least one hour when the assembly is subjected to the standard fire exposure tests.

### **.32 Floor marking: hoistway**

- .1 Identify each landing by means of markings on the inside of the hoistway.
- .2 Place these markings so that people in a stalled elevator will be able to readily see the floor marking upon opening the car doors.
- .3 Use a stencil to ensure that the floor markings are neat and uniform in appearance.
- .4 Provide numerals and letters approximately 100 mm (4") high and of a clearly contrasting colour to the colour of the doors and fascias.

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### **.33 Door equipment dowelling**

- .1 After the hangers, interlocks, relating devices, door operating clutches, rollers and other door equipment have been correctly adjusted, install dowels or pins to prevent movement or unauthorized readjustment.

### **.34 Freight door detector: multiple beams**

- .1 Provide a multiple infra-red beam door detector device for the protection of the entrance.
- .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 car gate and hoistway door to re-open.
- .3 Embed the receivers and emitters on both sides of the car entrance to protect them against damage.
- .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 entrance opening, the elevator parks at the current floor with its door and gate open and the lights off.
- .6 Provide a signal on the unit or in the machine room to indicate that a failure has occurred.
- .7 Provide protection for the unit so that it cannot be damaged by merchandise trucks moving on and off the elevator.
- .8 Supply a device, reliable and consistent in operation, not affected by dust or temperature changes, and having inherent long term reliability with minimum maintenance.

### **.35 Freight power gate operation**

- .1 Provide car gate operator complete with AC motors and solid state controls.
- .2 Provide a solid state car gate VVVF operator control incorporating closed loop negative feedback circuits for position, acceleration, velocity and torque.
- .3 Provide a serial input to the gate control to allow adjustment of speed, acceleration, torque and other parameters by the use of a notebook computer.

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- .4 Adjust the closing speed to an average of 300 mm (12") per second, respecting the limiting values for force and inertia.
- .5 Adjust the opening speed to an average of 700 mm (28") per second.
- .6 Arrange that the car gate starts to close at a reduced speed of 75 mm (3") per second for an adjustable period of time (initially set at three seconds).

### **.36 Car gate**

- .1 Protect the car entrance by a solid panel stainless steel gate of the vertical sliding type.
- .2 Provide a single or double section gate as required to suit the hoistway clearances.
- .3 Guide the gate on steel tracks.
- .4 Counterbalance the gate with enclosed counterweights.
- .5 Vertically align the gate tracks to each other and the rails with a tolerance of 1.5 mm (1/16").
- .6 Provide auxiliary car gate safety devices to support the car gate should the primary suspension means fail.

### **.37 Freight gate closing warning**

- .1 Provide a flashing yellow light activated five seconds before the car gate starts to close and remaining activated until the hoistway door is closed.
- .2 Provide a repeating audible message "Warning doors closing" activated five seconds before the car gate starts to close and continuing until the hoistway door is closed.

### **.38 Door operation: power bi-parting automatic**

- .1 Provide automatic sequence closing of the doors and gate.
- .2 Arrange that the car gate closes before the hoistway doors start to close.

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### **.39 Freight door operation: power VVVF**

- .1 Provide alternating current electric motors for each hoistway entrance.
- .2 Provide a solid state VVVF operator control incorporating closed loop negative feedback circuits for position, acceleration, velocity and torque.
- .3 Provide a serial input to the control to allow adjustment of speed, acceleration, torque and other parameters by the use of a notebook computer, tablet, PDA or other similar device.
- .4 During the opening cycle, operate the door panels at a speed of not less than 0.34 metres per second (1 fps).

### **.40 Car gate restrictor**

- .1 Provide a car gate restrictor to mechanically prevent the opening of the car gate 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.

### **.41 Entrance floor markings**

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

### **.42 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.

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### **.43 Car station: freight**

- .1 Provide a car station consisting of a bank of buttons numbered to correspond to the openings served, an alarm button, an emergency stop switch (spring return) and buttons for operating the doors and gates.
- .2 Inset the car station into the side of the car enclosure to protect the buttons and switches.
- .3 Provide in this station the devices required for operation, including:
  - .1 Floor push buttons;
  - .2 Door open button;
  - .3 Door close button;
  - .4 Light key switch;
  - .5 Fan key switch;
  - .6 Independent service key switch;
  - .7 Emergency lighting test key switch;
  - .8 Alarm button.
- .4 Number the car call buttons to correspond to the floor served.
- .5 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.
- .6 Cause the alarm button, when pressed, to ring alarm bells, one located in the hoistway and one located remotely, and to operate distress signals such as a buzzer and indicator in a remote location.
- .7 Provide, only when required by the prevailing codes, an emergency stop button.
- .8 Cause the stop button to actuate the alarm signals as if the alarm button were also pressed.
- .9 Arrange, where allowed by the prevailing codes, that the stop button return by spring action to the normal position.

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- .10 Submit, for review, shop drawings showing the design and finish.
- .11 Provide up and down buttons in the cart station for freight "inching" operation.

### **.44 Floor passing and stopping tones**

- .1 Provide an audible tone, arranged to sound midway between floors, having an adjustable volume level of between 55 and 70 decibels, as measured from within the elevator cab, to indicate to the passengers in the elevator that the elevator is passing from one floor to another.
- .2 Provide an audible tone of a different nature, having an adjustable volume level of between 55 and 70 decibels, as measured from within the elevator cab, arranged to sound when the elevator is levelling into the floor, to indicate to the passengers in the elevator that the elevator is stopping at the floor.
- .3 Arrange that the operation of these tones is field-selectable and does not require software changes to enable or disable their functioning.

### **.45 Car position indicator: digital readout**

- .1 Provide a digital car position indicator mounted in each car operating panel.
- .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.

### **.46 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.



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- .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 three 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.
- .47 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.

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- .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 Connect the wiring on the car to a terminal block mounted in or adjacent to the telephone box.
  - .12 Terminate the wiring in the machine room at a separate enclosed external terminal block mounted on the controller.
  - .13 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.
  - .14 Where more than one controller is in a common machine room bring wiring to one common terminal block.
  - .15 Clearly mark the terminal block.
  - .16 Provide wiring of the twin conductor shielded type with grounded shields.
  - .17 Provide equipment and wiring compatible with and acceptable to the telephone company providing service to the project.
  - .18 Provide material and labour as necessary so as to ensure that the communication system meets the requirements of the Code.
- .48 Hall push button stations: freight power doors**
- .1 Provide a riser of hall push button stations.
  - .2 Provide one station for each floor.
  - .3 Provide surface mounted hall push button stations projecting no more than 25 mm (1") beyond the wall surface.

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- .4 Provide at the intermediate floors, for each station, up and down push buttons located one above the other with call registered lights.
  - .5 Provide at the upper terminal and lower terminal, for each station, a single button with call registered light.
  - .6 Illuminate the call registered light only when there is an elevator in service to respond to the call.
  - .7 Provide in each hall push button station door 'open' and 'close' buttons for each elevator.
  - .8 Secure the hall push button stations to the wall using countersunk spanner head fasteners or approved equivalent.
- .49 Hoistway access switch**
- .1 Provide hoistway access switches in accordance with the Code.
  - .2 Locate the switches in the entrance frame or in the sight guard in an inconspicuous place.
- .50 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 102 mm x 102 mm (4" x 4") junction box on the elevator car top labelled "Elevator CCTV Provisions" from the elevator to a separate 254 mm x 254 mm (10" x 10") junction box in the elevator machine room (location to be determined by Owner) labelled "Elevator CCTV Provisions". Install 19 mm (0.75") EMT conduit where wiring external to the hoistway is needed.
  - .3 Provide CAT6e cable between the two above junction boxes.
  - .4 Provide an excess loop of 3050 mm (10') of cable at both ends.
  - .5 Provide a 110 vac - 15A dedicated power source labelled "Elevator CCTV Power" inside the 10" x 10" junction box at elevator machine room to power the camera.

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### **.51 Security system**

- .1 Provide for the future installation of an elevator card reader security system as follows:
  - .1 One single gang box (preferably recessed) in the elevator cab by the control buttons with a stainless steel cover.
  - .2 One 102 mm x 102 mm (4" x 4") junction box in the elevator machine room.
  - .3 Provide 25 mm (1") EMT conduit where wiring external to the hoistway is needed, with pull string.

### **.52 Hoistway entrance unlocking devices**

- .1 Provide hoistway door unlocking devices for each hoistway entrance.

### **.53 Cab fan and light 'Green Control'**

- .1 Provide a device in the cab to remove power from the cab lights and fan when there is no one in the elevator.
- .2 Arrange that the cab lights and fan are turned off in five minutes when:
  - .1 No movement in the cab is sensed;
  - .2 The elevator is level at a floor;
  - .3 The elevator doors are closed;
  - .4 The elevator has not been selected to answer a call;
  - .5 The elevator is on automatic operation;
  - .6 The elevator safety circuit (including interlocks) is intact.
- .3 Should any of the above conditions no longer obtain or when telephone communication is initiated, turn the car lights and fan on.
- .4 Use a triaxial accelerometer to detect movement.
- .5 Provide a Henning "Light Watcher" device or approved equivalent.

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### **.54 Car signal lights**

- .1 Provide LED car position indicators and car 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 within the car does not exceed 5 percent.
- .4 Arrange that the variation in intensity and contrast ratio between car call registered lights within the car does not exceed 5 percent.
- .5 All measurements are to be made in the normal ambient light of the cab.

### **.55 Cab: standard freight**

- .1 Enclose the car on the ceiling and the non-access sides with stainless steel, reinforced for rigidity.
- .2 Make the enclosure virtually flush on the inside.
- .3 Provide 250 mm (10") high rubber or plastic bumper rails on either side and rear of the car, at a height of 100 mm (4") above the floor, extending the full depth of the car with tapers at the ends.
- .4 Fasten the bumper rails to a rigid structure behind the car side panels.
- .5 Mount the capacity plate and certificate frame so that they are protected from accidental damage when the elevator is being loaded and unloaded.
- .6 Provide anti-skid steel flooring of minimum 6 mm (1/4") thickness, with a floor slip rating (R Rating) of not less than R11, attached securely to the sub-flooring using countersunk flush fastenings.

### **.56 Hall sills: stainless steel**

- .1 Provide new stainless steel hall sills.

## Elevator Modernization

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### **.57 Hall position indicator: digital**

- .1 Provide a digital position indicator mounted in each hall push button 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.

### **.58 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.

### **.59 Overload detector**

- .1 Provide elevator cab load-weighing devices, associated control software and in-car signalling equipment to provide an audible and visible overload warning.
- .2 Arrange that the cab load-weighing devices and associated control software activate the in-car overload signalling equipment when 100 percent of rated elevator capacity is reached.
- .3 Prevent the elevator from operating until the elevator cab load is decreased to a value below the overload threshold.
- .4 Provide a light with visible text 'Overloaded Elevator' which illuminates and an audible warning which sounds when an overload condition exists.

## Elevator Modernization

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- .5 Extinguish the light and silence the audible warning when the overload condition no longer exists.

### **.60 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 30 mm (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 pit floor and to within less than 300 mm (12") and more than 150 mm (6") of the underside of the overhead slab.

### **.61 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.

### **.62 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).

### **.63 Travelling cable**

- .1 Provide travelling cables with flame-retarding and moisture-resisting outer covers and stranded conductors.

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- .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 RG-59U 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).
- .64 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 mm<sup>2</sup> 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.



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- .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**

#### **.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.
- .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.

#### **.2 Hydraulic: jack installation**

- .1 Install the plastic pipe centred 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.

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- .3 Install the new jack centred on the car sling and plumb within 3 mm (1/8") over its length.

### **.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.

### **.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;
- .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.

### **.5 Operation: simplex collective**

- .1 Provide a micro-processor based simplex control for the elevator.

### **.6 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.

## Elevator Modernization

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### **.7 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.

### **.8 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.

### **.9 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.

### **.10 Operation: independent service**

- .1 Provide independent service.

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- .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.
  
- .11 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 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.

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### **.12 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.

### **.13 Door open pause time: freight**

- .1 Arrange the circuits so that when the car stops at a floor or when the door open button is pressed, the doors open and then close after a predetermined adjustable length of time (approximately 15 seconds).
- .2 Make the time adjustable over a range from 5 seconds to 40 seconds.
- .3 Arrange the circuits so that the door open pause time is cancelled if the door close button is pressed.

### **.14 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 either hall or car doors actually striking the object or person.

### **.15 Freight "inching" operation**

- .1 Provide inching operation for the freight elevator to manually move the elevator at reduced speed within the levelling zone via the car station up and down buttons.
- .2 Limit the elevator speed to 10 fpm during inching operation.
- .3 Once inching operation is activated, disable the automatically re-levelling feature for an adjustable period of time (default 5 minutes) or until the freight doors close.
- .4 Operation of the inching feature shall initiate the yellow warning light (as required during gate closing operation) and sound an audible alarm.

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### **.16 Deadweight change**

- .1 Weigh the car and the counterweight 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).
- .2 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.
- .3 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 plus between 40 percent and 45 percent of the contract load;
  - .4 Post the Auxiliary Data Tag on the car crosshead.
- .4 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;

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- .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.
  - .5 Provide an Auxiliary Data Tag to meet the requirements of latest edition of the Code.
  - .6 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.
  - .7 For traction elevators, test the traction relations in accordance with the latest edition of the B44 code.
- .17 Noise level: door operation**
- .1 Arrange the equipment so that the noise level, as measured within the cab, does not exceed 67 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.
  - .3 Measure the noise level using an ANSI type 2 sound level meter on the "A" scale with an "F" response.
- .18 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.

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

### **.19 Noise level: 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 machine room, does not exceed 80 decibels.
- .2 Measure this noise level using an ANSI type 2 sound level meter on the "A" scale with an "S" response.

### **.20 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 keeping the car at the floor level.

### **.21 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.

### **.22 Operating time**

- .1 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.



## Elevator Modernization

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- .2 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.

### **.23 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 control "handshaking" compatible with the building interconnections.
- .3 Provide switches and indicators in the hall and car stations as required by Code.

### **.24 Emergency power**

- .1 Emergency power sufficient to run the elevator will be provided by others.
- .2 Arrange that, when running on emergency power, the elevator does not overload the emergency power supply when accelerating, running or decelerating.
- .3 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.
- .4 The supplier of the emergency power system (provided by others) will arrange that:
  - .1 The emergency power source will provide sufficient power to run the elevator 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

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at 15 seconds) prior to power supply transfer in either direction - from normal to emergency or from emergency to normal.

- .5 Arrange that when the 'Emergency Contact' is open the signal light marked "ELEVATOR EMERGENCY POWER" is illuminated.
- .6 Arrange that when the 'Delayed Contact' is open, the elevator stops.
- .7 Arrange that when the 'Emergency Contact' is open and the 'Delayed Contact' is closed the elevator will run normally answering hall and car calls.
- .8 Arrange that on emergency power the normal safety devices including door open buttons, safety edges and door protective devices, remain operational.
- .9 Provide the indicators and switches in the hall station and elsewhere as necessary for the emergency power operation.

END OF SECTION

## Elevator Commissioning

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### Section 14220 Elevator Commissioning

#### 1 General

##### .1 General requirements

.1 Conform to Section 14200.

##### .2 Summary

.1 The commissioning process is intended to provide the Owner with a high level of assurance that the elevator has been installed in the prescribed manner, and will operate within performance guidelines established by the Specifications:

.1 Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for beneficial use by the Owner.

.2 Elevator components included in the commissioning process include; but are not limited to, the following:

- .1 Pump motor;
- .2 Machine room equipment;
- .3 Speed control devices;
- .4 Entrance protective devices;
- .5 Elevator Pit equipment;
- .6 Elevator Hoistway equipment;
- .7 Controllers;
- .8 Signaling Devices;
- .9 Door Safety Devices;
- .10 Car Interiors.

## Elevator Commissioning

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### **.3 Related requirements**

- .1 Contract Drawings and Specifications, General Conditions of the contract, including supplementary conditions, electrical, and mechanical provisions, and additional Specification sections listed in this Specification apply to work of this Section.

### **.4 Testing**

- .1 The tests will be witnessed by the Owner's staff or representatives:
  - .1 Witnessing the tests will serve as a compliment to the operations and maintenance training.
  - .2 Performance tests do not take the place of the tests performed by the Authority Having Jurisdiction nor by the Consultant.
- .2 Performance tests include; but not be limited to, the following:
  - .1 Pumping machine unit: Elevator Contractor's representative will demonstrate operational conformance to the project contract documents and prevailing code requirements:
    - .1 The operating testing includes loading the elevator to its rated capacity and operating the elevator continuously for 30 minutes.
    - .2 The elevator will travel the full distance stopping at each level and proceeding immediately to the next level.
    - .3 During this test the temperature rise of the motor is recorded.
  - .2 Controllers: Elevator Contractor's representative will field test and verify operation of the controller to demonstrate conformance to the project contract documents and prevailing code requirements:
  - .3 Signalling Devices: Elevator Contractor's representative will field test and verify operation of each signalling device on all floors for each elevator.
  - .4 Door Safety Devices: Elevator Contractor's representative will field test and verify operation of each door safety device on all floors for each elevator.
  - .5 Testing listed in specifications: Elevator Contractor's representative will execute other tests set out in the specifications.

## Elevator Commissioning

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### **.5 Closeout activities**

- .1 In order to obtain substantial performance, the following documents must be submitted:
  - .1 TSSA initial and final reports;
  - .2 Final wiring diagrams;
  - .3 Final Operation & Maintenance manuals;
  - .4 Test data forms;
  - .5 A signed copy of the "Commissioning Checklist" (included in tender documents).
- .2 Training: Elevator Contractor or manufacturer's representative will provide training to Owner's staff.

END OF SECTION  
END OF SPECIFICATION

Elevator Modernization

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**Appendix A -  
DFL Project Notes & Procedures**



## DFL PROJECTS GENERAL NOTES, & PROCEDURES

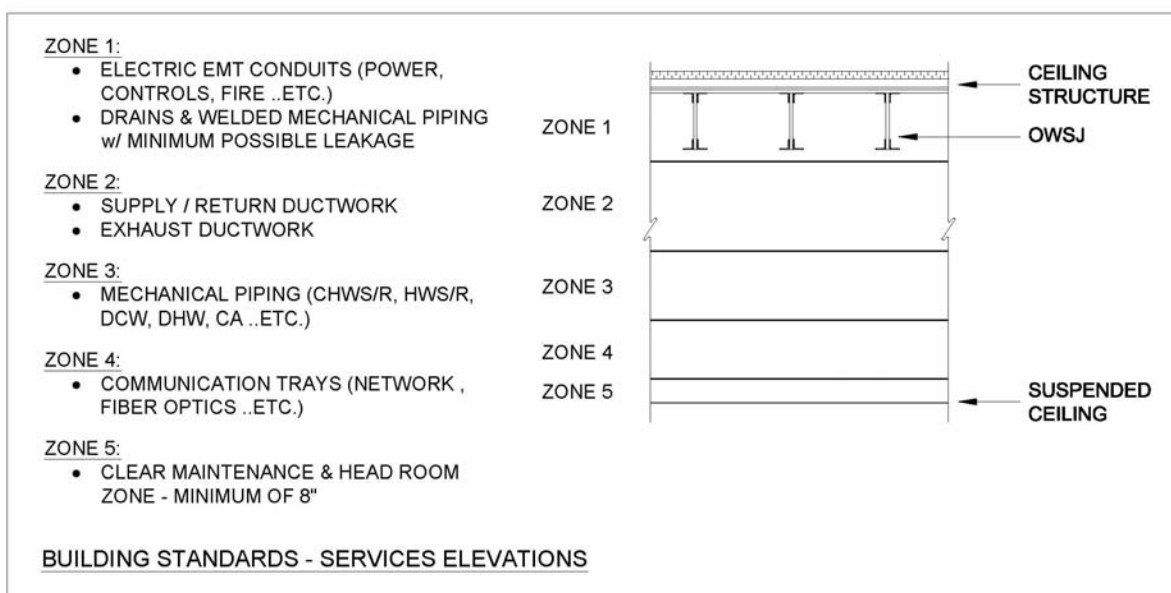
1. The general contractor shall arrange and pay for all necessary permits, inspections & re-inspections required to be performed by local authorities having jurisdiction including inspection and testing except for building permit to the City of Ottawa which will be applied for by owner. Turn over to the owner all original approval documentation & certificates.
2. Contractor to be responsible for the provision (supply and installation) of all materials, equipment & services shown on the project drawings & specifications as required for a fully operable system, unless changed or replaced by revised drawings, specifications or addenda.
3. The general contractor shall be responsible for all architectural, structural, mechanical, electrical, plumbing & fire protection work. Be responsible for all floor cutting, core drilling, all chases, openings and patching as may be required by all sub trades who may or may not be under his contract agreements.
4. Drawings are not intended to show the details & route of each component to be installed or removed. They are only providing a general overview of the project scope. The contractor shall be responsible to review the site conditions during the tender period and examine the extent of the demolition, removals & new installations to include in the tender price all necessary labor and material required for a fully operable system as intended.
5. All materials and workmanship shall be in accordance with the current codes, by-laws and ordinances of the relevant building authorities where varied by the project spec.
6. All dimensions to be verified on site. Exact location & elevation of equipment is subject to site measurements.
7. Contractor to submit shop drawings for all material, equipment & fixtures to engineer for approval before commencing installation or ordering. All samples to be provided upon CSA request at no additional cost.
8. All supplied materials, fixtures & equipment to be new, free from defects, certified & approved by code. Reuse of any existing parts is not permitted unless approved by owner.
9. CSA shall be given the option of retaining any removed or demolished components or equipment. Coordinate and hand over to CSA project manager as required. Dispose of any remaining or unwanted equipment or services and remove off site in a legal manner and comply with the environmental protection act, Ontario regulations for waste management program. Certificate of disposal to be handed over to owner after removals are done.
10. Install all equipment in full accordance with the manufacturer specifications & recommendations.
11. All trades should be licensed to perform all work shown on the drawings including removals & demolition.
12. Do not damage existing fire separations and fire protections in the project areas. Any damages incurred to existing fire separations and protections shall be restored to approved conditions to meet required rating and codes at no additional costs to the project.
13. Under any circumstances, do not block required access to exits and fire escape routes during the project duration. All existing life safety systems and indicators shall be operational at all times.

14. Smoke eaters & powered exhaust fans vented to outside of building must be used during all brazing / welding / soldering / cutting / grinding activities to minimize contamination & odor to adjacent areas particularly in clean rooms. Provide 72 hour notice to CSA to arrange for hot work permits.
15. Contractor to protect all architectural finishes & flooring during construction, be responsible for any damages to existing surfaces resulting from all project's work. The contractor shall make good all damaged surfaces including any paint touch-ups required. Repair all walls, floors & ceilings in core area where mechanical & electrical services pass through.
16. Exact tarping limits and access routes to be determined on site in coordination with CSA project manager.
  - All tarps to be **new** heavy duty polyethylene, water / mildew / tear resistant, **white**, tight sealed from deck to floor, contractor to provide access zippers or doors as required by CSA, use metal studs as framing supports, no wood materials to be used in tarps construction unless approved by CSA.
  - Approved methods to attach studs / tarps to building as follow:
    - On floors: heavy duty commercial double sided tape to secure metal studs to floors, use of screws or tapcons are not permitted.
    - On drywalls / masonry / metal siding walls: duct or tuck tape is not allowed directly on building finishes as it will damage them when removed; apply masking paint green tape first and then duct / tuck tape on top of it. Studs can be screwed to drywall / masonry walls giving that all holes will be patched & painted (whole wall / area to be painted, small / local paint patches are not permitted).
  - Tarps could be hanged off building steel structural using high strength cable ties, provide heavy gauge unistruts as needed for cross runs or to distribute tarps load.
  - Hanging tarps from building services (ductwork, conduits, pipes, supports, hangers ... etc.) is not permitted.
  - Contractor is responsible for cleaning, patching, repairing & painting all damaged surfaces & tape marks after removing tarps.
17. Provide floor protection to entire project areas before any work starts as follow:
  - Floor to be wiped clean from any debris or dust particles.
  - Provide min. 1/8" foam layer directly on all flooring.
  - Provide hard sheets on top of foam layer, all sheets seams to be duct-taped to prevent debris / dust from getting trapped under the protection sheets. Use of OSB sheets is not permitted.
18. Provide furniture and equipment protection as follow:
  - Office / lab furniture and equipment: to be completely covered and wrapped with **new** heavy duty **clear** plastic roll sheets.
  - Sensitive lab testing equipment: to be completely covered and wrapped with **new** heavy duty **clear** plastic roll sheets, **clean** scaffolding to be erected on top of all lab equipment to protect from possible falling objects.
19. Contractor to provide bilingual construction, access & safety signage, signs to be posted on all project fences & entrances at the start of project and before commencing any work.
20. Access to the site for material, work forces and for waste removal is to be coordinated with CSA project manager, use only elevators designated by CSA and protect them from damage.
21. When testing activities are not underway, large or small loading docks can be used to move materials in and out of the building from 7:00 am to 8:00 am without CSA needing to provide notice to building staff. If access is required after this time or for longer periods, 72 hour notice must be provided to CSA to confirm availability and arrange for proper notices.
22. Sanitary facilities will be assigned for contractor's personnel. Others shall not be used. Keep facilities clean.
23. Only designated areas are to be used for lunch and break time. All other areas are off limits including campus cafeteria.



24. Contractor to respect all building floor loading limitations, coordinate and confirm with CSA project manager prior to bring in any heavy tools, equipment and lifts.
25. General contractor shall be responsible to keep the owner's access areas and corridors clean at all times.
  - Clean and remove all demolition and construction waste from project site on daily basis and upon completion of project.
  - Transport all loose materials in / out of building in clean covered containers.
  - Do not use CSA waste containers. An area will be designated for locating contractor waste bins upon request.
  - Contractor to provide all cleaning equipment & supplies, use of building cleaning equipment or supplies are not permitted.
26. Do not subject any part of the building to any noise, dust or any other unacceptable environmental conditions during the course of the project. Any noisy / dusty / smelly activities shall be done after regular working hours or weekends, coordinate with CSA project manager with a minimum notice of 72 hours.
27. All penetrations through walls and floors shall be saw-cut or core drilled. Jack hammering is not permitted. All walls, floors & ceilings penetrations to be sealed by contractor in accordance with applicable codes & the engineer's requirements. Use of powder actuated tools using explosives is not permitted.
28. Parts noted to be supplied by owner shall be fully installed & supported by contractor at no additional cost.
29. Projects may take place in a cleanroom environment, mandating special measures be taken to reduce laboratory disruption. Class 8 cleanroom standards are to be met for the area surrounding construction at all times and are subject to verification.
30. All personnel must attend mandatory DFL briefing on the first day of project and before starting any work, adhere to the information presented at all times. any person who did not attend this briefing will not be allowed to work on site – no exceptions
31. Improper / unclean / ripped clothing, foul language, improper behavior, smoking in undesignated areas including e-cigarettes will not be tolerated and worker will be escorted off campus immediately – no exceptions.
32. CSA, at their discretion, may request a worker to leave the site if there is demonstrated impaired mental or physical capability affecting his/her work performance and possibly putting others at risk due to consumption of alcohol or illegal substances.
33. DFL is a high profile occupied building, use of music or radio on site is not permitted at all times.
34. All GC & sub-trades workers have to be escorted at all times while in building and on campus.
  - CSA will provide security commissionaires to escort.
  - Prior to project start, GC to provide a full list of all personnel working on the project as well as engineers, suppliers & inspectors if possible to issue necessary forms for site and building access.
  - Provide at least 72 hour notice for any additional names or for after hours or weekend work.
  - Notify CSA immediately of any change in schedule that affects the need for security escorts.
  - Individuals who are not on that list will be denied access with no exceptions.
35. General contractor representative has to be present on site at all times and accompany all sub-trade workers; sub-trades are not allowed to be on site or to work without the presence of approved designated GC representative – no exceptions.
36. Weekend and/or after-hours shutdowns to be scheduled in agreement with CSA project manager. Provide at least 72 hour notice in advance.

37. CSA is committed to ensuring a healthy and safe environment for its employees, contractors and visitors and will align itself with contractors who share in this vision.
- The requirements outlined below are provided as reference and are there to assist the contracting company who performs the work and accepts this commitment completely:
    - Ontario occupational health and safety act:  
<http://www.e-laws.gov.on.ca>
    - Infrastructure health and safety association “guide to developing health and safety policies and programs in construction” a comprehensive guide geared to mid- to large-sized general contractors for developing and implementing an effective health and safety program:  
<http://www.ihsa.ca>
    - Infrastructure health and safety association “construction health and safety manual”. guidance on hazard controls for Ontario contractors:  
<http://www.ihsa.ca>
  - The general contractor will be required to prepare and submit to the CSA project manager a full site specific project health and safety plan, herein called PHSP, prior to the commencement of any works and within 2 weeks of contract award. Plan to be reviewed & approved by CSA before starting any work.
  - The general contractor shall provide CSA project manager a copy of all notices or other written correspondence provided to or received by the Ontario Ministry of Labor (OML) for the duration of the contract.
  - The general contractor shall fully implement the PHSP for the full duration of the contract.
  - A copy of all applicable training certificates must be provided prior to commencing any work. Certificates must show exact company name and address that provided the training. CSA reserves the right to request the course outline from the company that provided the training. If the proof of training does not demonstrate the worker as being competent operators, further training may be requested by the CSA prior to commencing any work at no additional cost.
38. GC to provide a minimum of 48 hour notice to CSA prior for any deliveries. General contractor must be on site to receive the shipment. If the delivery pertains to lifting equipment, one of the qualified contractors scheduled to use the equipment must inspect and receive the lift from the rental company.
39. GC and all his sub-trades are responsible to provide all ladders, scaffolding, lifts, cranes and all other equipment & tools required for project scope including installing & removing tarps & protection materials. Use of building tools, equipment, trollies, forklifts, skids, ladders, lifts, cranes ... etc. are not permitted.
40. Only the use of clean electrical lifts is permitted anywhere inside the building, use of propane / diesel / gas powered lifts are not permitted except when used outside the building.
41. All trades to follow building service elevations standard as follow:



42. General contractor and all trades to strictly follow campus, cleanrooms & CSA/DFL procedures at all times, GC is responsible to distribute all procedures to all his workers & sub-trades.

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**Company Name**

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**Signature and date**