

SPECIFICATIONS



SMALL FREIGHT ELEVATOR REPLACEMENT

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ISSUED FOR TENDER

SPECIFICATIONS:

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1. PRECEDENCE

- .1 For Federal Government projects, General Instructions Sections take precedence over technical specification sections in other Divisions of this Project Manual

2. MINIMUM STANDARDS

- .1 Materials shall be new unless identified otherwise and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2005 (NBC) and all applicable Provincial and Municipal codes including all amendments up to tender closing date and other codes of provincial or local application. In the case of conflict or discrepancy the most stringent requirement shall apply. Meet or exceed requirements of:

- .1 Contract documents.
- .2 Specified standards, codes and referenced documents.

3. SHOP DRAWINGS

- .1 Submit for the Engineer's review, five (5) copies of each shop drawing.
- .2 The review is for the sole purpose of ascertaining conformance with the general design concept, and does not mean approval of the design details inherent in the shop drawings, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents.
- .3 Do not commence manufacture or order materials before shop drawings are reviewed.

4. SAMPLES

- .1 Samples: examples of materials, equipment, quality, finishes, workmanship.
 - .1 Submit two (2) copies of samples for review.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

5. PRODUCT DATA

- .1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.
- .2 Submit five (5) copies of product data.
- .3 Delete information not applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract Documents.

6. TAXES

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

7. FEES, PERMITS AND CERTIFICATES

- .1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

8. FIRE SAFETY REQUIREMENTS

- .1 Comply with the National Building Code of Canada 2005 (NBC) for fire safety in construction and the National Fire Code of Canada 2005 (NFC) for fire prevention, fire fighting and life safety in building in use.
- .2 Comply with Human Resources and Skills Development Canada (HRSDC), Fire Commissioner of Canada (FCC) standards:
 - .1 No. 301: Standard for Construction Operations, available from Fire Protection Engineering Services, Labour Program, HRSDC or following internet site: www.hrsdc.gc.ca/en/lp/lo/fp/standards/301.shtml
 - .2 No. 302: Standard for Welding and Cutting, available from Fire Protection Engineering Services, Labour Program, HRSDC or following internet site: www.hrsdc.gc.ca/en/lp/lo/fp/standards/302.shtml
 - .3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor), available from Fire Protection Engineering Services, Labour Program, HRSDC or following internet site: www.hrsdc.gc.ca/en/lp/lo/fp/standards/374.shtml
 - .4 Retain all fire safety documents and standards on site.
- .3 Welding and cutting:
 - .1 Before welding, soldering, grinding and/or cutting work, obtain a permit from the Fire Prevention Unit as directed by the Engineer. Store flammable liquids in approved CSA containers inspected by the Fire Prevention Unit. No open flame shall be used unless authorized by the Fire Prevention Unit.
 - .2 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Engineer:
 - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
 - .2 Completed welding permit as defined in FCC 302.
 - .3 Return welding permit to Engineer immediately upon completion of procedures for which permit was issued.
 - .3 A fire watcher as described in FCC 302 shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 10m may be ignited by conduction or radiation.
- .4 Where work requires interruption of fire alarms or fire suppression, extinguishing or protection systems:
 - .1 Provide watchman service as described in FCC 301; In general, watchman service is defined as an individual conversant with Fire Emergency Procedures, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.
 - .2 Retain services of manufacturer for fire protection systems on daily basis or as approved by FCC, to isolate and protect all devices relating to:

- .1 Modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
- .2 Cutting, welding, soldering or other construction activities which might activate fire protection systems.
- .5 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
- .6 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

9. SCHEDULING

- .1 Schedule:

On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When the schedule has been reviewed by the Engineer, take necessary measures to complete work within scheduled time. Do not change construction schedule without notifying Engineer.
- .2 Working Hours:
 - .1 "Regular Hours" are defined as Monday to Friday from 08:00 to 16:00 hours excluding statutory holidays.
 - .2 "Off Hours" are defined as Monday to Friday from 16:00 to 08:00 hours and on Saturdays, Sundays, and statutory holidays.
 - .3 The Contractor may be permitted to carry out work during "Off Hours" subject to pre-authorization by the Engineer.
- .3 Work in Occupied Areas:
 - .1 Carry out work during "off hours". Thoroughly ventilate areas painted and carpeted areas during "off hours".
 - .2 Give the Engineer 48 hours notice for work to be carried out during "off hours".
 - .3 Carry out all work, which is in the opinion of the Engineer noisy or disruptive to the occupants, during "off hours" Monday to Friday from 16:00 to 08:00 hours and on Saturdays, Sundays, and statutory holidays.

10. FIELD QUALITY CONTROL

- .1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licensed workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

11. REMOVED MATERIALS

- .1 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

- .2 Materials identified to be removed, salvaged and/or recovered and reinstalled or reused are to be cleaned, inspected, maintained and are to be securely stored on site as approved by Engineer.
- .3 Prior to reuse or reinstallation of any materials not already identified for reuse or reinstallation in the contract documents, obtain approval of engineer a minimum of 72 hours in advance.

12. PROTECTION

- .1 Protect finished work against damage until take-over.
- .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
- .3 Protect operatives and other users of site from all hazards.
- .4 Protect all existing equipment, fixtures, finishes, etc. that are to remain against any and all damage until take over. Repair and clean any damaged or soiled existing equipment, fixtures, finishes, etc.
- .5 Place all existing window blinds in their raised position and protected by sealed plastic bags completely encasing the blinds and their mechanisms. Ensure that all blinds are functional before protecting. Identify and provide list of all blinds that are not functioning properly for verification by the Engineer. At the end of work, the Contractor shall remove protective cover and clean all blinds.
- .6 Protect all existing duct sensitive sensors (smoke detectors) from construction-generated dust. If smoke detectors require to be by-passed, dust generating work shall be carried out after hours.
- .7 All dust generating work preparatory work, i.e.: pipe/conduit, cutting, threading, etc., must be carried out outside of air handling plenum. Only assembly of materials is permitted in plenum area.
- .8 Provide filter media on all return air openings from each floor for the duration of the project. Replace the filter media on a regular weekly schedule.

13. USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with Engineer to facilitate work as stated. Refer to article 9. Scheduling for work that must be done during "off hours".
- .2 Maintain existing services to building for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Sanitary facilities will be assigned for Contractor's personnel. Others shall not be used. Keep facilities clean.
- .5 Closures: Protect work temporarily until permanent enclosures completed.
- .6 The Engineer will schedule use of elevators, elevator lobbies, loading docks, and travel routes to loading docks. The Contractor must submit a request for access forty-eight (48) hours in advance for specified periods of time. Where approved for use, protect at

all times from damage, safety hazards and overloading of existing equipment and exceeding operating requirements.

14. SITE STORAGE

- .1 The Engineer will assign storage space which shall be equipped and maintained by the Contractor.
- .2 Do not unreasonably encumber site with materials or equipment.
- .3 Move stored products or equipment which interfere with operations of Engineer or other contractors.
- .4 Obtain and pay for use of additional storage or work areas needed for operations.

15. CUT, PATCH AND MAKE GOOD

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items so shown or specified.
- .3 Patch and make good surfaces cut, damaged or disturbed, to Engineer's approval. Match existing material, colour, finish and texture.
- .4 Perform scanning of existing concrete floor slabs for all areas to be subjected to cutting and/or coring. Submit copies of scanning reports/results to Engineer.
- .5 Install fire stops and smoke seals in accordance with ULC-S115-1995 around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly. Fill in all openings resulting from removals with firestop and smoke seals in accordance with ULC-S115-1995.

16. SLEEVES, HANGER AND INSERTS

- .1 Co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Engineer's approval before cutting into structure

17. EXAMINATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Dimensions of all existing building elements are for information only and must be verified on site. Contractor is responsible to verify all dimensions and report any discrepancies to the Engineer.

18. PROJECT MEETINGS

- .1 Engineer will arrange the following project meetings and assume responsibility for setting times and recording and distributing minutes. The contractor's key personnel and subtrade key personnel will attend these meeting as noted:
 - .1 Project-specific construction meetings: every week. (Project Manager, Site Supervisor, Health and Safety Coordinator and each Major Subtrade Representative)
 - .2 Schedule review meetings: every 2 weeks. (Project Manager, Site Supervisor, and each Major Subtrade Representative)

19. SIGNS

- .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, re-routing of operations and client deliveries etc., in both official languages or by the use of commonly-understood graphic symbols to the Engineer's approval.
- .2 No advertising will be permitted on this project

20. ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations

21. SCAFFOLDS AND WORK PLATFORMS

- .1 Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.
- .2 Provide design drawings, signed and sealed by qualified Professional Engineer licensed in the province of Ontario, where prescribed.
- .3 Additions or modifications to scaffolding must be approved by Professional Engineer in writing

22. WASTE MANAGEMENT

- .1 Comply with the Environmental Protection Act, Ontario Regulations O.Reg. 102/94 and O. Reg. 103/94 for waste management program on construction and demolition projects.
- .2 Conduct "waste audit" to determine waste generated during demolition or construction operations, prepare written "waste reduction work plan" and implement procedures to reduce, reuse and recycle materials to the extent possible.
- .3 Provide a "source separation program" to disassemble and collect in an orderly fashion the following "materials designated for alternative disposal" from the "general waste" stream.
 - .1 brick and Portland cement concrete.
 - .2 cardboard (corrugated).
 - .3 gypsum board (unfinished).
 - .4 steel.
 - .5 wood (not including treated or laminated wood).
- .4 Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including:
 - .1 Time and date of removal
 - .2 Description of material and quantities.

- .3 Proof that materials have been received at an Approved Waste Processing Site or certified Waste Disposal Site as required.

23. OPERATIONS AND MAINTENANCE MANUALS

- .1 Submit to Engineer six (6) copies of approved Operations Data and Maintenance Manual in both official languages, compiled as follows:
 - .1 Bind data in vinyl hard cover 3 "D" ring type loose leaf binders for 212 x 275 mm size paper. Binders must not exceed 75 mm thick or be more than 2/3 full.
 - .2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.
 - .3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .2 Include following information plus data specified.
 - .1 Maintenance instruction for finished surface and materials.
 - .2 Copy of hardware and paint schedules.
 - .3 Description: Operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.
 - .4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:
 - .1 lubrication products and schedules.
 - .2 trouble shooting procedures.
 - .3 adjustment techniques.
 - .4 operational checks.
 - .5 Suppliers names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.
 - .5 Guarantees showing:
 - .1 Name and address of projects.
 - .2 Guarantee commencement date (date of Interim Certificate of Completion).
 - .3 Duration of guarantee.
 - .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
 - .5 Signature and seal of Guarantor.
 - .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
- .3 Spare parts: List all recommended spares to be maintained on site to ensure optimum efficiency. List all special tools appropriate to unique application. All parts/tools

detailed must be identified as to manufacturer, manufacturer part number and supplier (including address).

- .4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

24. RECORDS

- .1 As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to Engineer's inspection for issuance of final certificate of completion, supply to the Engineer one (1) set of white prints with all deviations neatly inked in. The Engineer will provide two sets of clean white prints for this purpose.

25. GUARANTEES AND WARRANTIES

- .1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with Engineer

26. CLEAN UP

- .1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the Engineer, remove debris from site, neatly stack material for use, and clean up generally.
- .2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Wash and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's directions.
- .4 Clean areas under contract to a condition at least equal to that previously existing and to approval of Engineer.

27. SECURITY CLEARANCES

- .1 All personnel employed on this project will be subject to security check. Obtain requisite clearance, as instructed, for each individual required to enter the premises.
- .2 Personnel will be checked daily at start of work shift and given a pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

28. SECURITY ESCORT

- .1 All personnel employed on this project shall be escorted when executing work in non-public areas during normal working hours. Personnel shall be escorted in all areas after normal working hours.
- .2 Submit an escort request to Engineer at least 48 hours before the service is needed. For requests submitted within the time mentioned above, the costs of the security escort will be paid for by the Engineer. The cost incurred by a late request will be charged to the Contractor.

- .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 24 hours before the scheduled time of the escort. The cost incurred by a late cancellation will be charged to the Contractor.
- .4 The calculation of costs will be based on the average hourly rate of a security officer for a minimum of eight hours per day for a late service request and of four hours for late cancellations.

29. BUILDING SMOKING ENVIRONMENT

- .1 Smoking is not permitted in the Building. Obey smoking restrictions on building property

30. DUST CONTROL

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.
- .2 Maintain and relocate protection until such work is complete.
- .3 Protect all furnishings within work area with 0.102 mm thick polyethylene film during construction. Remove film during non- construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .4 Protect all occupied, operating finished areas and equipment from dust.

31. COST BREAKDOWN

- .1 Before submitting first progress claim submit breakdown of Contract Amount in detail, as directed by Engineer and aggregating the Contract Amount. After approval by Engineer cost breakdown will be used as the basis of progress payments

32. HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: Demolition of spray or trowel-applied asbestos is hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of demolition work, immediately stop work and notify Engineer.

END OF SECTION

PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:
- .1 Description of overall structure of CX Plan and roles and responsibilities of CX team.
- 1.2 REFERENCES .1 Public Works and Government Services Canada (PWGSC)
- .1 PWGSC - Commissioning Guidelines CP.4 -3rd edition-03.
 - .2 Underwriters' Laboratories of Canada (ULC)
- 1.3 GENERAL .1 Provide a fully functional Elevator:
- .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "CX" in this section means "Commissioning".
- .3 Use this CX Plan as master planning document for CX:
- .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of CX.
 - .2 Communicates responsibilities of team members involved in CX Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of CX.
 - .4 Describes process of verification of how built works meet design requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of CX.
 - .2 General description of elements that make up CX Plan.
 - .3 Process and methodology for successful CX.

- .4 Acronyms:
 - .1 CX - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 MSDS - Material Safety Data Sheets.
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 TAB - Testing, Adjusting and Balancing.
 - .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred CX - CX activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.4 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update CX Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every two (2) weeks during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised CX Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.5 CX PARTICIPANTS

- .1 Employ the following CX participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 - .4 Client: responsible for intrusion and access security systems.
 - .5 Ensure that CX participant:
 - .1 Could complete work within scheduled time frame.

- .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 - .1 Redistribution of electrical services.
 - .2 Modifications of fire alarm systems.
 - .3 Modifications to voice communications systems.
 - .6 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for CX 3 weeks prior to starting date of CX for review and approval.
- 1.6 EXTENT OF CX
- .1 CX Structural and Architectural Systems:
 - .1 Architectural and structural:
 - .1 Accessibility and operational safety:
 - .2 Vertical transportation systems:
 - .1 Freight elevators.
 - .2 Commission mechanical systems and associated equipment:
 - .1 HVAC and exhaust systems:
 - .1 HVAC systems
 - .2 Smoke control systems installed in contract.
 - .2 Fire and life safety systems.
 - .3 EMCS:
 - .3 Commission electrical systems and equipment:
 - .1 Electronic data and communications information systems.
 - .2 Emergency power generation systems.
 - .3 Lighting systems.
 - .4 Fire alarm systems, equipment.
- 1.7 DELIVERABLES RELATING TO O&M PERSPECTIVES
- .1 General requirements:
 - .2 Compile English and French documentation.
 - .3 Documentation to be computer-compatible format ready for inputting for data management.
 - .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.8 DELIVERABLES
RELATING TO THE CX
PROCESS

.1 General:
.2 Start-up, testing and CX requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:
.1 CX as used in this section includes:
.1 CX of components, equipment, systems, subsystems, and integrated systems.
.2 Factory inspections and performance verification tests.

.3 Deliverables: provide:
.1 CX Specifications.
.2 Startup, pre-CX activities and documentation for systems, and equipment.
.3 Completed installation checklists (ICL).
.4 Completed product information (PI) report forms.
.5 Completed performance verification (PV) report forms.
.6 Results of Performance Verification Tests and Inspections.
.7 Description of CX activities and documentation.
.8 Description of CX of integrated systems and documentation.

.4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

.5 Departmental Representative to participate.

1.9 INSTALLATION
CHECK LISTS (ICL)

.1 Refer to Section 01 91 33 - Commissioning (CX) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.10 PRODUCT
INFORMATION (PI)
REPORT FORMS

.1 Refer to Section 01 91 33 - Commissioning (CX) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.11 PERFORMANCE
VERIFICATION (PV)
REPORT

.1 Refer to Section 01 91 33 - Commissioning (CX) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.12 CX REPORTS

.1 Submit reports of tests, witnessed and certified by

		Departmental Representative to Departmental Representative who will verify reported results.
	.2	Include completed and certified PV reports in properly formatted CX Reports.
	.3	Before reports are accepted, reported results to be subject to verification by Departmental Representative.
<u>1.13 ACTIVITIES DURING WARRANTY PERIOD</u>	.1	CX activities must be completed before issuance of Interim Certificate, it is anticipated that certain CX activities may be necessary during Warranty Period, including: .1 Fine tuning of HVAC systems. .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.
<u>1.14 TRAINING PLANS</u>	.1	Refer to Section 01 91 41 - Commissioning (CX) - Training.
<u>1.15 FINAL SETTINGS</u>	.1	Upon completion of CX to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in CX Reports.
<u>PART 2 - PRODUCTS</u>		
<u>2.1 NOT USED</u>	.1	Not Used.
<u>PART 3 - EXECUTION</u>		
<u>3.1 NOT USED</u>	.1	Not Used.
END		

PART 1 - GENERAL

1.1 SUMMARY .1

Section Includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

1.2
INSTALLATION/START-
UP CHECK LISTS

.1 Include the following data:

.2 Product manufacturer's installation instructions and recommended checks.

.3 Special procedures as specified in relevant technical sections.

.4 Items considered good installation and ing industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made; indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT
INFORMATION (PI)
REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.

-
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.5 SAMPLES OF COMMISSIONING FORMS

- .1 Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, but are not available from Departmental Representative develop appropriate verification forms and submit to Departmental Representative for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by Departmental Representative.

1.7 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of

items indicated on these forms.

- .3 Confirm operation as per design criteria and intent.
- .4 Identify variances between design and operation and reasons for variances.
- .5 Verify operation in specified normal and emergency modes and under specified load conditions.
- .6 Record analytical and substantiating data.
- .7 Verify reported results.
- .8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.
- .9 Submit immediately after tests are performed.
- .10 Reported results in true measured SI unit values.
- .11 Provide Departmental Representative with originals of completed forms.
- .12 Maintain copy on site during start-up, testing and commissioning period.
- .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual in accordance with Section 01 91 51 - Building Management Manual (BMM).

1.8 LANGUAGE .1 To suit the language profile of the awarded contract.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

<u>1.1 SUMMARY</u>	.1	Section Includes: .1 This Section specifies roles and responsibilities of Commissioning Training.
<u>1.2 TRAINEES</u>	.1	Trainees: personnel selected for operating and maintaining this facility. Includes: Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
	.2	Trainees will be available for training during later stages of construction for purposes of familiarization with systems.
<u>1.3 INSTRUCTORS</u>	.1	Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following: .1 Start-Up, operation, shut-down of equipment, components and systems. .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices. .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
	.2	Contractor and equipment manufacturer to provide instruction on: .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.
<u>1.4 TRAINING OBJECTIVES</u>	.1	Training to be detailed and duration to ensure: .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions. .2 Effective on-going inspection, measurements of system performance. .3 Proper preventive maintenance, diagnosis and trouble-shooting. .4 Ability to update documentation. .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.
<u>1.5 TRAINING MATERIALS</u>	.1	Instructors to be responsible for content and quality.

- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be two (2) hours in length.
- .3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.8 TRAINING CONTENT

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

- .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
 - .7 Maintenance and servicing.
 - .8 Trouble-shooting diagnosis.
 - .9 Inter-Action among systems during integrated operation.
 - .10 Review of O&M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 01 00
- .2 Section 14 20 60

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .4 ASTM C847, Standard Specification for Metal Lath.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181, Ready-Mixed, Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16.1, Limit States Design of Steel Structures.
 - .4 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59, Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- .4 The Environmental Choice Program
 - .1 CCD-047, Paints - Architectural Surface Coatings.
 - .2 CCD-048, Surface Coatings - Recycled Water-borne.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 01 00.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 01 00. Indicate VOC's:
 - .1 For finishes, coatings, primers and paints.

- .2 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 00 01.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Storage and Protection:
 - .1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
 - .2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 00 01.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with applicable provincial and municipal regulations.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by applicable provincial and municipal regulations.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M standard weight, black and galvanized finish.
- .3 Expanded metal mesh: to ASTM C847.
- .4 Welding materials: to CSA W59.

- .5 Welding electrodes: to CSA W48 Series.
- .6 Bolts and anchor bolts: to ASTM A307.
- .7 Grout: to Section 04 05 12 - Masonry Mortar and Grout; non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600g/m² to CAN/CSA-G164.
- .2 Shop coat primer: to CAN/CGSB-1.40.
- .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.5 SHOP PAINTING

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

2.6 ACCESS LADDERS

- .1 Stringers: 65 x 8 mm thick, flat steel bars.
- .2 Steel Rungs: 20 mm diameter, welded to stringers at 300 mm on centre.

- .3 Brackets: sizes and shapes as indicated, weld to stringers at 1050 mm on centre, or as indicated, complete with fixing anchors.
- .4 Galvanize finish for exterior, prime paint for interior.
- .5 Galvanize exterior ladders after fabrication

Part 3 Execution

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Architect such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 ACCESS LADDERS

- .1 Install access ladders in locations as indicated.
- .2 Erect ladders 150 mm clear of wall on bracket supports.

3.3 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 01 00.
- .2 Section 14 20 60

1.2 REFERENCES

- .1 American Concrete Institute. (ACI)
 - .1 ACI 308, Standard for Curing Concrete.
- .2 American Society for Testing and Materials (ASTM International)
 - .1 ASTM C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
 - .2 ASTM C672, Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 1.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 01 00.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation, storage and handling instructions.
- .3 Certificates:
 - .1 Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

1.4 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact.
- .2 Protect from freezing, moisture, water and at temperature and humidity settings recommended by manufacturer. Dry store crystalline waterproofing products at 7°C minimum.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 01 00.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with applicable provincial and municipal regulations.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .6 Divert unused metal materials from landfill to metal recycling facility.
- .7 Fold up metal banding, flatten and place in designated area for recycling.

1.7 WARRANTY

- .1 Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents or Canadian Law.
- .2 Warranty period: 5 years, commencing on Date of Substantial Performance of Work.

Part 2 Products

2.1 CEMENTITIOUS WATERPROOFING MATERIALS

- .1 Cementitious waterproofing on finished concrete: dry powder, organic and inorganic crystalline growth, capillary chemical reaction type waterproofing consisting of compound of Portland cement, silica sand and other active chemicals.
 - .1 Acceptable product and manufacturer: Xypex Concentrate® as manufactured by Xypex Chemical Corporation, or pre-approved equivalent.

2.2 MIXES

- .1 Mix materials in accordance with manufacturer's written instructions.

Part 3 Execution

3.1 INSTALLERS

- .1 Provide experienced and qualified technicians to carry out application and installation of concrete concentrate admixture.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations, specifications, including product technical bulletins, catalogue installation instructions, product carton handling, storage and installation instructions.

3.3 PREPARATION

- .1 Ensure surfaces are clean and free of laitance, dirt, film, paint, coatings or other foreign matter harmful to performance of waterproofing materials.
- .2 Ensure surface has open capillary system to provide tooth and suction for crystalline waterproofing material. Where concrete surfaces are too smooth, as determined by

manufacturer's representative, acid etch, sandblast or waterblast as recommended by waterproofing manufacturer.

- .3 Rout out defects, such as, cracks, faulty construction joints, honeycombing and other defects to sound concrete and repair in accordance with waterproofing manufacturer's repair procedures manual.
- .4 Finish horizontal surfaces to receive crystalline waterproofing treatment using rough wood float or broom.

3.4 REPAIR OF SURFACE DEFECTS

- .1 Form tie holes, construction joints, cracks:
 - .1 Chip defective areas in "U" shaped slot 9.1 mm x 25.4 mm (3/4 inch x 1 inch) wide and minimum 25.4 mm (1 inch) deep.
 - .2 Clean slot, wet-saturate with water and remove surface water.
 - .3 Apply slurry coat of waterproofing admixture at rate of 0.8 kg/m² (1.5 lb/sq yd) to slot.
 - .4 Allow slurry to reach initial set.
 - .5 Fill cavity with waterproofing admixture.
 - .6 Compress tightly into cavity using pneumatic packer or hammer and blocks.
- .2 Rock pockets, honeycombing or other defective concrete:
 - .1 Rout out defective areas to sound concrete.
 - .2 Remove loose material and saturate with water.
 - .3 Remove surface water and apply one slurry coat of waterproofing admixture.
 - .4 After slurry has set, but while still "green," fill cavity to surface with hydraulic cement.
- .3 Coves, sealing strips, expansion and control joints:
 - .1 Prepare concrete joint surfaces by application of one coat of waterproofing admixture in slurry form at 1.0 kg/m² (2.0 lb/sq yd).
 - .2 Apply waterproofing admixture or Portland cement fortified admixture in mortar consistency while slurry coat is stillgreen, but after slurry coat has reached initial set.
 - .3 Coves: Trowel apply and pack Portland cement fortified admixture into cove shape.
- .4 Sealing strips: Fill pre-formed grooves, 19.1 mm (3/4 inch) wide and minimum 25.4 mm (1 inch) deep, located at construction joints with waterproofing admixture. Compact tightly using pneumatic packer or hammer and block.
- .5 Expansion and control joints: Treat expansion joints as special condition as directed by design professional

3.5 APPLICATION

- .1 Wetting Concrete: Treat saturate surfaces with clean water to enhance crystallization formation process within concrete. Remove excess surface water before application of waterproofing treatment.
- .2 Construction: Apply 1.0 kg/m² (2.0 lb/sq yd) of waterproofing admixture in slurry form to joint surfaces between concrete pours. Moisten joint surfaces prior to slurry application.

- .3 Surface Application: Apply waterproofing treatment uniformly with semi-stiff bristle brush under conditions and application rate recommended by manufacturer. Consult with manufacturer for application when spray equipment is used.
 - .1 One-coat application: Apply waterproofing admixture slurry coat at rate and locations indicated.
 - .2 Two-coat application: Apply Portland cement fortified admixture slurry coat while first coat of waterproofing admixture is still “green,” but after reaching initial set. Use light, pre-watering between coats when rapid drying conditions occur.
- .4 Curing:
 - .1 Cure waterproofing treatment using misty fog spray of clean water after waterproofing coating has hardened.
 - .2 Avoid coating damage with spray operation. Spray waterproofing treated surface 3 times each day for 2 to 3 days.
 - .3 In hot climates, as determined by treatment manufacturer, spray waterproofing treated surfaces at intervals recommended by treatment manufacturer technical representative.
 - .4 During curing period, protect treated surfaces from rainfall, frost and puddling of water.

3.6 FIELD QUALITY CONTROL

- .1 Have the manufacturer of products supplied under this Section review work involved in the handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of work with Contract.
- .2 Manufacturer’s field services: Provide manufacturer’s field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer’s instructions.
- .3 Schedule site visits to review work at stages listed:
 - .3 Upon completion of the work, after cleaning is carried out.
- .4 Obtain reports, within 3 days of review and submit immediately to Architect.

3.7 CLEANING

- .1 Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.8 PROTECTION

- .1 Protect installed product from damage during construction.

END OF SECTION

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR**PART I GENERAL****1.1 General Scope
Of Elevator Work**

- .1 The work described herein includes for all labour and material, including overtime labour required by the Contract Schedule, to modernize by replacing substantially all equipment and restoring to operating condition and to first-rate standards one (1) hydraulic freight elevator to include but not limited to the following:
- .2 New heavy-duty power unit with reservoir tank, valve, motor and pump.
- .3 New microprocessor-based solid state electrical controller.
- .4 New door equipment, freight-door motors, doors, gate and all related hardware.
- .5 New stainless steel, led-illuminated push buttons in car and at hall stations.
- .6 New stainless steel fixtures including car- position indicators.
- .7 Full parts and labour preventive maintenance after modernization is complete for a subsequent twelve (12) month period.
- .8 Phase I Manual Emergency Recall and Phase II In-car Emergency Service operation.
- .9 New cylinder with PVC protection.
- .10 All associated electrical work as outlined herein.
- .11 Above is a brief description only. The following specifications detail the Work.

**1.2 Related Work by
Elevator Contractor**

- .1 Provide updated crosshead data plates on car tops complete with all pertinent information required by Code.
- .2 Patch all redundant holes in machine room floor and landing walls.
- .3 Provide car top guard rails to OHS/A/TSSA standards where clearance to back wall or adjacent hoistway exceeds 300 mm.
- .4 Remove redundant 208/575 volt transformer from machine room.

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR

1.3 Related Work

By Owner

- .1 Provide for the monitoring of the car cab emergency telephone device.
- .2 Provide florescent tube lighting and light switch in the pit, per Elevator Code 2.7.5 . Light switch to be accessible from pit ladder. Provide one (1) GFI duplex receptacle connected to a dedicated 15 amp branch circuit. Provide metal guards for all pit lights.
- .3 Provide increased machine room lighting to 200 lux ambient as required for new machine and controller installations.
- .4 Provide heating and cooling of the elevator machine room to maintain a temperature of 5EC to 32EC. Heat output of the elevator is predicted to be 7,000 BTU/hour when operating.
- .5 Convert 110 v receptacles in machine room to GFIC type.
- .6 Provide one 600/3/60 fused disconnect switch for the mainline supply of the elevator, connected to the terminals of the elevator controller. Use rigid conduit or provide a separate path for ground when metallic tubing is used. Elevator motor size is predicted as 15 HP. Provide a direct connection to earth ground from the electrical supply to the mainline disconnect in elevator machine room.
- .7 Provide new 600 v/ 3 ph fused disconnect in machine room with power feed downstream to power door controller box.
- .8 Provide new 110 v/ 1 ph 15 amp fused disconnect switch for elevator cab lighting.
- .10 Provide waterproofed and drained elevator shaft bottom (pit). Related sump pump equipment must have capacity of 3,000 Gallons per hour and should not be located in the elevator pit.
- .11 Provide a metal pit ladder. Elevator Code 2.7.3.4 describes the ladder. It should be positioned by the elevator contractor's on-site crew.

1.4 Bidder's Instructions

- .1 Submission of bid will be considered presumptive evidence that Bidder is conversant with local facilities and conditions, requirements of the documents and of pertinent provincial and local codes, state of labour and material markets and has made due allowance in his proposal for all difficulties. Should Bidder's investigation of local codes or rules reveal stipulations contrary to the specifications, he shall advise the Consultant without delay. Should a Bidder find any

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR

discrepancy in, or omissions from any of the specifications, or be in doubt as to their meaning, he shall advise the Consultant. Bids are assumed to be in complete conformance with this specification unless explicitly written on the bid submission otherwise.

- | | | |
|--|----|--|
| <u>1.5 Procedure</u> | .1 | Obtain Owner's approval before removing elevator from automatic operation. |
| <u>1.6 Fire and Safety Requirements</u> | .1 | Comply with National Building Code 2005 (Part 8, Health and Safety Measures at Construction and Demolition Sites) and Provincial Regulations for Construction Projects. |
| | .2 | Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada. |
| | .3 | Comply with the Owner's site security regulations. |
| <u>1.7 Powder Actuated Fastening Devices</u> | .1 | Do not use powder actuated tools using explosives, unless approved in writing by the Consultant, and in conformance with CAN3-Z166.2, <i>Use and Handling of Powder Actuated Tools</i> . |
| <u>1.8 Cutting, Patching and Making Good</u> | .1 | Cut existing surfaces as required to accommodate new work. |
| | .2 | Patch and make good all surfaces cut, damaged or disturbed. Match existing material, colour, finish and texture. |
| <u>1.9 Building Smoking Environment</u> | .1 | Obey and direct sub-contractors, suppliers and delivery people to obey, Owner's site restrictions on smoking. |
| | .2 | Do not smoke in the elevator machine room, hoistway or pit area. |
| <u>1.10 Dust Control</u> | .1 | Provide dust tight screens or partitions to localize dust generating activities and for protection of workers, finished areas of work and public. |
| | .2 | Maintain and relocate protection until such work is completed. |
| | .3 | Protect Owner's property adjacent to work area with low fire spread tarps or screens during construction. Remove protection during non-construction hours and leave premises |

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR

in clean, unencumbered and safe manner for normal daytime function.

- 1.11 Scheduling .1 Within two (2) weeks of obtaining Owner's intent to proceed with the Work, submit to Consultant a bar-chart construction schedule for the Work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Consultant take necessary measures to complete the Work within the scheduled time. Do not change the schedule without notifying the Consultant. When schedule is changed by mutual agreement, promptly issue new schedule.
- .2 Include, in this schedule, the following information:
- .1 Material lead time.
 - .2 Site modernization time.
 - .3 Adjustment and finish-up time.
 - .4 Proposed progress billing schedule.
- 1.12 Occupied Building .1 Make allowances for the Work being carried out in an occupied building including proximity to the general public. Provide all signage and barricades to protect public from hazards arising from this work.
- .2 Take proper care to avoid noise, clutter or obstruction in the corridors and arrange for storage of materials and tools where they will cause minimum inconvenience.
- .3 Do not use solvents or other products in quantity that is objectionable to building tenants.
- .4 Where excessive noise or obstruction is unavoidable, make arrangements with the Owner to complete that portion of the Work at a mutually agreed time.
- .5 Normal working hours to be 8:00 AM - 4:00 PM each Monday through Friday other than International Union of Elevator Constructors' holidays. Staff the Work with a minimum of two employees each day for the duration of the project, except as explicitly directed otherwise by these Specifications or by the Owner or Consultant.
- 1.13 Protection of Work and Hoistways .1 Comply with Canadian Code for Construction Safety and the Provincial Construction Safety Act.
- .2 Confirm that any existing structural beams are safe and suitable before lifting loads.

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR

- .3 Erect hoarding at each floor where there is an unlocked elevator hoistway door. Install plywood hoarding at landing entranceways from floor to ceiling. Plywood to be a minimum of 13 mm thick. Hoarded work space to be at least as wide as the elevator entrance opening and should create a work space inside hoardings of at least 1220 mm deep. Securely fasten hoarding to wall.
- .4 Upon removal of hoardings and partition make good all damage to surfaces of walls, floors and ceilings.
- .5 Use hoarded entranceways, and not the in-service elevator, for movement of equipment or garbage.
- .6 Protect existing floors by covering with 13 mm plywood and tarpaulins as a minimum, when removing or delivering materials.
- .7 Protect finished work against damage until take-over.
- .8 Protect premises against spread of dust and dirt beyond work areas. Use all possible measures to prevent dust.
- .9 Protect occupants and other users of site from all hazards.
- .10 Do not remove partition or hoarding until Work is complete and approval is given by the Consultant.

1.14 General Conditions

- .1 Before beginning Work, submit for Consultant's approval detailed drawings as specified herein. Submit appropriate drawings to Regulating Authority. Survey the existing hoistways and machine room to facilitate the preparation of the drawings.
- .2 Indemnify and save the Owner harmless from liability directly arising from the Contractor's completion of the Work, except if not caused by the negligence of the Contractor, its agents, sub contractors or suppliers, including but not limited to cost and expense for, or on account of, any unpatented or patented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner. Said liability may arise from an act(s) of the Contractor, or their sub contractor or supplier of services, or from the omission or delay in carrying out an act(s).
- .3 The Contractor shall not be liable for any loss, damage, or delay caused by acts of government, labour strikes, labour lockouts, riot, civil commotion, war, malicious mischief, acts of God or other cause beyond their reasonable control.

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- .4 Perform the erection of this equipment by certified Elevating Device Mechanics skilled in the installation of elevator machinery and elevator entrances. Provide adequate supervision of this work. Dress all construction personnel in company uniforms or coveralls identified with the Contractor's name and logo.
 - .5 Continuously maintain adequate protection of the Work from damage and protect the Owner's property from injury or loss. Make good any damage, injury or loss arising from Work except if not caused by the Contractor, its agents, sub contractors or suppliers.
 - .6 Remove rubbish daily as it accumulates. Keep the building and premises clean during the progress of the work.
 - .7 Perform the Work in compliance with all applicable provisions of all Federal, Provincial and local labour laws.
 - .8 After the award and signing of the Contract, all business relating to the Work shall be transacted through the office of the Owner unless otherwise instructed.
 - .9 Be registered and in good standing with the Workplace Safety and Insurance Board and carry premises liability insurance in the amount of \$5,000,000.00 inclusive, to be coverage against any claims from damage to property or for personal injury, including death, which may arise from this contract.
 - .10 The Owner's insurance policy covers work and equipment actually in place in the building and approved and accepted by Consultant. All material and equipment stored on the premises and not actually installed is not included in the Owner's policy and such material and equipment is stored at the risk of the Contractor.
 - .11 Furnish competent men and equipment for conducting speed, load, and such other acceptance tests as the Consultant may deem advisable.
 - .12 The Work may be thoroughly inspected by the Consultant during construction and upon completion. Expect to have work occasionally interrupted by Consultant's inspection.
 - .13 Do not remove, disconnect or de-activate any fixtures or features of the existing elevator system unless specified otherwise herein.
- 1.15 Definition of Terms**
- .1 The term "Code" as used herein refers to Canadian Standards Association publication CAN/CSA-B44-10 Safety Code for Elevators.
 - .2 All of the terms in the specifications have the definitions given in Code.

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR

- .3 The term "provide" or "furnish" as used herein, means to supply and install new equipment.
 - .4 The term "refurbish" as used herein, means the provision of all labour, modifications, parts, etc., which are needed to return the component to as-new operating condition. Bidders to submit any assumptions with regard to degree of refurbishment required, at time of bid submission.
 - .5 The term "may be retained" advises the contractor that this would be acceptable to meet the specified requirements of the contract but does not confirm compatibility with contractor's proposed line of equipment or conformance to Code or requirements of regulating authorities.
 - .6 The terms provide, supply, refurbish etc. may be used with singular nouns but in such cases are defined to apply to all elevators and all equipment as is necessary to complete the Work to first class standards.
- 1.16 Reference Standards .1** Perform work to the following minimum standards:
- .1 CAN/CSA-B44-10 Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks including Supplements 1 and 2.
 - .2 CSA C22. No.77 Motors with Inherent Overheating Protection.
 - .3 CSA C22.2 No. 141 Unit Equipment for Emergency Lighting.
 - .4 Technical Standards and Safety Act, Ontario Regulation Elevating Devices Code Adoption Document.
 - .5 C22.1 Canadian Electrical Code, particularly Section 38.
 - .6 Ontario Building Code.
- .2 Utilize materials as specified in every respect and with at least a three (3) year history of stable operation. Demonstrate these requirements prior to the awarding of a contract, if requested.
- .3 Provide materials in accordance with the approved samples.
- 1.17 Payments Withheld .1** Payments to the Contractor may be withheld for any of the following:
- .1 Defective work or deficiencies not corrected.
 - .2 Failure of Contractor to make payments properly to

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Sub-contractor(s) or for material and labour.

- .3 Failure to work to schedule.
- .4 Damage to the building or another contractor.
- .5 Failure to meet specifications or performance criteria.

1.18 System Description .1

The elevator system consists of one (1) hydraulic elevator designated as prov. # 23 042. Provide / maintain the following as is applicable:

- .1 Class: Freight Elevator - general freight loading.
- .2 Capacity: 3,000 lbs.
- .3 Speed: 60 fpm.
- .4 Control: Two stop automatic
- .5 Doors: 5'9" wide x 7'0" high. Power vertical bi-part.
- .6 Floors: 1 and 2

1.19 Control and Operation .1

Provide two-stop automatic operation as follows.

- .1 Provide a single car operating panel. Use stainless steel faceplates, containing flush mounted LED illuminated type stainless steel push buttons to correspond with landings served. Use Dupar US 93 vandal-resistant buttons.
- .2 When lifting rated load, do not permit car speed to vary from rated speed by more than 10%.
- .3 Mount flush illuminated type stainless steel single push buttons at each terminal landing and "UP" and "DOWN" buttons with stainless steel faceplates at the intermediate landings.
- .4 Start car upon momentary pressure of one or more car or landing buttons, other than those for landing at which car is standing, and cause car to stop at first landing for which car or landing button is pressed, corresponding to direction in which car is travelling.
- .5 Stop car at landings for which calls are registered and make these stops in order in which landings are reached, irrespective of sequence in which buttons are pressed, provided button for given landing is pressed sufficiently in advance of arrival of car at that

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landing to permit stop to be made.

1.20 Manual
Emergency Recall

- .1 Provide emergency recall service to be initiated manually by switch located at the recall level. When recall has been initiated:
 - .1 The elevator controlled by the recall switch and on automatic operation, including independent service operation, shall return directly to the recall level where the doors shall open and remain open. The elevator shall not respond to the landing or car call buttons. Travelling to a terminal landing first and then reversing to travel to the recall level is not acceptable.
 - .2 The elevator that is stopped with the doors closed, or is travelling towards the recall level, shall proceed non-stop to the recall level.
 - .3 The elevator travelling away from the recall level shall reverse at or before the next available landing without opening its doors.
 - .4 A car stopped at a landing shall have its emergency stop switch rendered inoperative as soon as the doors are closed and the car starts to move. A moving car shall have its emergency stop switch rendered inoperative.
 - .5 All call registered lights and directional lanterns shall be extinguished and remain inoperative. Position indicators, in the car and at the recall level, should remain in service.
 - .6 The car shall be provided with a visual and audible signal system which shall be activated to alert passengers that the car is on the emergency recall operation and at least the visual signal shall remain operative until the car reaches the recall level.
 - .7 An elevator stopped at a floor other than the recall level with doors open shall close its doors and proceed non-stop to the recall level.
 - .8 Door re-opening devices that may be affected by smoke or hot gases shall be rendered inoperative.
 - .9 If the elevator is on inspection operation, a signal shall warn the inspector to return the car to the recall level. The elevator shall remain under the control of the inspector.
 - .10 The recall operation shall be terminated when both switches at the main control panel and lobby panel are in the "RESET" or "OFF" position, as is

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appropriate.

- .11 Include for connecting the fire alarm signal through the recall switch.
- .2 Phase II Emergency In-Car Operation
 - .1 Provide in-car emergency service for each elevator initiated by a key switch located in the car station. The switch shall be marked "OFF - HOLD - ON" and the key shall be removable in the OFF and HOLD positions. The switch shall become effective in initiating in-car emergency operation when in the "ON" position, provided the emergency recall operation is in effect and the car has returned to the recall level.
 - .2 The elevator shall be operable only by a person in the elevator.
 - .3 The elevator shall not respond to elevator landing calls.
 - .4 The opening of power-operated doors shall be controlled only by continuous pressure on the "DOOR OPEN" button. If the "DOOR OPEN" button is released during the "OPEN" motion, the door shall reclose immediately. When doors are fully open, they shall remain open until closed as in point 5.
 - .5 Door re-opening devices for power-operated doors shall be rendered inoperative.
 - .6 The doors shall be closed and the car started by registering a car call and constant pressure on the "DOOR CLOSE" button or on any car call button.
 - .7 Momentary operation of the in-car emergency service switch to the "HOLD" position shall cancel registered car calls.
 - .8 When the car is at a landing and the key switch in the car is turned to the "HOLD" position, the doors shall remain open and car calls cannot be registered.
 - .9 When the car is at a landing and the key switch in the car is turned to the "OFF" position, the car shall automatically return to the recall level as on emergency recall operation regardless of the position of the emergency recall switch.
 - .10 The elevator shall be returned from In-car operation only when the car is at the recall level and the in-car switch is in the "OFF" position.

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- 1.21 Permits and Inspections .1 Obtain and pay for necessary Municipal or Provincial inspections and permits and make such tests as are called for by the regulations of such authorities. These tests shall be made in the presence of the authorized representatives of such authorities. Pay for reinspections carried out as long as any Elevator Contractor related deficiencies remain unresolved.
- .2 Provide the Owner and the Consultant with copies of reports, the same day they are received from authorities.
- .3 Undertake and apply for Design Submission before commencement of site work.
- 1.22 Samples .1 Submit to the Consultant, with shop drawings, samples of elevator finishes for:
- .1 Signal and operating fixtures.
- .2 Interior cab finishes including stainless steel.
- 1.23 Shop Drawings .1 Before beginning work, prepare all drawings necessary to show the general arrangement of the elevator equipment and other data which is called for and are to be submitted for review. Provide these drawings within two (2) weeks of notification of award of contract.
- .2 Drawing review is for the sole purpose of ascertaining conformance with the general design concept and does not mean approval of the design details inherent in the shop drawings, responsibility for which shall remain with the Contractor. Drawing review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract including this specification.
- .3 Use conventional Metric units of measurement.
- .4 Submit five (5) copies of each shop drawing for Consultant's review.
- .5 Indicate to scale on layout drawings:
- .1 Power unit, controller and all other components in machine room.
- .2 Car, jack unit, supporting beams, guide rails, buffers and other components in hoistway.
- .3 A section view of the hoistway including elevation of each floor served, pit depth and overhead.
- .4 Location of circuit breaker, switchboard panel or

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disconnect switch, light switch and feeder extension points in machine room.

- .5 Location in hoistway or machine room for connection of travelling cables for car light and communication system.
- .6 Signal and operating fixtures.
- .7 Locations and size of trap doors and access doors and load on hoist beam and location of trolley beams.
- .8 Heat dissipation of elevator equipment in machine room.

.6 Indicate on general arrangement drawings:

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

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

1.24 Record Drawings and Data

- .1 Provide three (3) sets of reproducible as-built wiring diagrams as well as three (3) sets of all final issue shop drawings. All drawings to be laminated or enclosed in plastic protectors and marked "as-built". Provide layouts stamped by a Professional Engineer registered in the province.
- .2 Provide one soft copy of the above information in AutoCAD format.
- .3 Mark up all field changes or additions to original wiring diagrams in red.

1.25 Operations and Maintenance Information

- .1 Provide three (3) copies of manufacturer's instructions and operation and maintenance manuals.
- .2 Include the following maintenance data:
 - .1 Description of elevator system's method of operation and control including motor control system, door operation, emergency recall operation and special or non-standard features provided.
 - .2 Replacement parts list.

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- .3 Include all wiring diagrams for all equipment on controllers.
- .4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which detail the following:
- lubrication products and schedules
 - trouble shooting procedures
 - adjustment techniques
 - operational checks.
- .5 Spare Parts:
- List recommended spares to be maintained on site to ensure optimum efficiency
 - List all special tools and appropriate unique applications.
 - Detail manufacturer and supplier names and addresses.
- .3 Include in the manuals a copy of the registered design submission and safety authority inspection reports.
- 1.26 Maintenance Service
- .1 Provide full-parts-and-labour maintenance for a twelve (12) month period following turnover. Indicate price for full parts and labour maintenance for the first month of a five (5) year maintenance contract.
- .2 Carry out maintenance inspections and tests in accordance with Owner's standard terms as distributed with this tender, section Section 8.6 of the ASME 17.1-2007/CSA B44-10 Safety Code for Elevators and Escalators, CSA Standard B44.2-07 Maintenance Requirements and Intervals for Elevators, Escalators, Dumbwaiters, Elevating Devices Code Adoption Document - Amendment 225/07, The Ontario Elevating Devices Act and Regulations and any active T.S.S.A. rulings as a minimum.
- .3 On a monthly basis systematically clean, lubricate and adjust all of the equipment as required.
- .4 Repair or replace electrical and mechanical parts of any equipment as required, whether due to defect or normal wear and tear.
- .5 Use only genuine standard parts of manufacturer of equipment.
- .6 Perform work by competent personnel under supervision and in direct employ of elevator manufacturer, or manufacturer's licensed agent.
- .7 Schedule work during regular Elevator Trade working hours with Owner.

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- .8 Maintain locally an adequate stock of parts for replacement or emergency purposes and have qualified staff available to ensure fulfilment of parts requirements in a timely fashion.
- .9 Include 24 hour call-back service required by equipment stoppage or malfunction at all times at no additional cost.
- .10 Ensure no elevator is out of service longer than 12 hours - keep Owner completely informed of equipment malfunctions on a continuing basis.
- .11 Maintain a standard type locked metal cabinet, in each machine room, stocked with a supply of parts known to require frequent replacement, manufacturer-recommended lubricants, cleaning supplies and schematic wiring diagrams.
- .12 Remove garbage at each monthly examination.
- .13 Paint equipment in the machine room prior to completion of the project. On floor use two coats of grey floor enamel. On machinery, use machinery enamel.
- .14 Provide a log book in each machine room, record all callbacks and repairs, as work is carried out. Provide an "acknowledgement of inspection" form at each inspection. If a computerized log is used, provide hard copy of records in the machine room within 60 days. On a monthly basis systematically clean, lubricate and adjust all of the equipment as required.

1.27 Quality of Work

- .1 Perform the work using mechanics skilled in the installation of elevator machinery and elevator entrances.
- .2 Comply with all applicable provisions of all federal, provincial and local labour laws and with all applicable union regulations contained in the union agreement, including any travelling and incidental expenses involved in the work.

1.28 Power Supply and Electrical Services

- .1 Make all necessary modifications to the electrical services relating to the elevators such as supplementary disconnect devices and connections to the controllers.
- .2 Design equipment to operate using the existing 600 volt, 3 phase power supply.
- .3 Provide necessary grounding, shielding, or bonding required to accommodate the new elevator equipment.
- .4 Carry out electrical modifications by a Licensed Electrician and arrange and pay for inspection by hydro utility as required. Provide a copy of utility permit to Owner.

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- 1.29 Use of Elevators
By Handicapped .1 Meet all requirements of Appendix "E" of Code, including:
- 1.30 Coordination .1 Coordinate work of all trades required to complete this contract.
- 1.31 Markings .1 Make all identifications and instructions in English and French or with international symbols.
- 1.32 Storage and
Handling .1 Store materials in elevator machine room or other area designated by the Owner in a manner offering adequate protection against bodily injuries, interference with work in progress or damages to work already completed.
- .2 Adequately protect painted or finished surfaces of all materials delivered to the site.
- 1.33 Guarantee .1 Provide a written guarantee that the material and workmanship of the apparatus installed under these specifications are first-class in every respect and that any defects - to new or refurbished materials - not due to improper use or care, which may develop within one (1) year from the date of final acceptance will be made good.
- .2 For proprietary equipment as determined by the sole discretion of the Consultant, provide a written guarantee of Owner's access to all wiring diagrams, diagnostic tools, source codes, spare parts, engineering calculations etc. as required for a third party to maintain the elevators. Guarantee to specify that materials and information to be supplied at cost plus 40% combined profit and overhead, maximum. Guarantee to specify an access period of ten (10) years, minimum.
- .3 Commence guarantee on all elevators at date of certification of Final Completion of final elevator, as certified by the Consultant.

REPLACEMENT OF FREIGHT HYDRAULIC ELEVATOR**PART 2 PRODUCTS****2.1 Components**

- .1 Use only major components which have performed satisfactorily together under conditions of normal use in not less than three (3) other elevator installations of similar design and for a period of at least three (3) years.
- .2 Major components are defined to include jack, motor, pump, valve, and operation/control system.
- .3 Provide all materials and equipment new and installed in a neat, accurate, workmanlike manner. Supply material in accordance with the approved samples.
- .4 Provide only system designs field tested for the application, with adequate capacity to meet all performance criteria and to provide long term, reliable operation. Reliable operation to encompass a malfunction rate of less than 0.6 occurrences per month per elevator, where only malfunctions that are serious enough to render the elevator unusable are considered.

**2.2 Electrical Wiring
Conduits and Fittings**

- .1 Furnish and install all new insulated wiring in all new ducts, flex or EMT, to connect all parts of the equipment including travelling cable, all wiring in hoistway, new components on car top and new wiring from disconnect switch to controllers and motors.
- .2 Use steel set screw type fittings where electrical metallic tubing is used.
- .3 Include at least 10% spare conductors in each cable. Tape and legibly identify all spare wires.
- .4 Suitably suspend the travelling cables to relieve strain in the individual conductors.
- .5 Run 600 volt wiring in electrical metallic tubing or other galvanized steel raceway. Include a covered ground wire same size as feeders in the raceway.
- .6 Include at least three (3) pairs of shielded wires for audio, video or other electronic equipment - minimum 20 gauge.
- .7 Do not parallel conductors to increase current carrying capacity unless individually fused.
- .8 Install a separate green bond wire in all raceway, including EMT and flexible conduit.
- .9 Provide additional disconnect switches and wiring if required by CEC, to suit new machine room layout.

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- .10 Include wiring, and connections to elevator devices remote from hoistway and between elevator machine rooms.
 - .11 Connect all wiring where required to building fire alarm system utilizing CFT qualified workers.
 - .12 Limit use of flexible conduit on car top to items that require movement or periodic adjustment.
 - .13 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run wiring in metal conduit, metallic tubing or wire ducts.
 - .14 When using conduits or troughs through floor, extend conduit or trough at least 100 mm above floor.
 - .15 Do not run conduit or wiring along the pit floor. Install all conduit and wiring, on unistrut, a minimum of 150 mm above pit floor.
 - .16 Fabricate wiring that is run in conduit or tubing to Table 6 of CEC Part 1.
 - .17 Use type ETT travelling cables.
- 2.3 Lubrication
- .1 Include means of lubricating bearings, requiring periodic lubrication.
 - .2 When used, provide grease fittings which fit same gun.
 - .3 Where grease cups are provided, use automatic feed compression type.
 - .4 Provide visible and easily accessible lubrication points.
- 2.4 Car Guides
- .1 Provide new guide assemblies
 - .2 Provide slipper guides with friction inserts.
 - .3 Provide guide operation, which is inaudible to passengers in car or outside hoistway with car operating at rated speed and car fan turned off.
- 2.5 Guide Rails and Brackets
- .1 Inspect all existing rail brackets to verify that they are securely fastened to the building structure. Tighten any loose brackets.
 - .2 Completely rails of grease and rust.

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- .3 Adjust guide rails for plumb and parallel within maximum deviation of 1.6 mm per any 6,000 mm section and 0.1 mm per any 25 mm section.
- 2.6 Buffers
- .1 Provide new spring buffers, stands and support channel.
- .2 Verify alignment of buffers to strike plates.
- .3 Provide buffer data plates, to Code.
- 2.7 Sound Isolation
- .1 Provide new resilient Neoprene pads to effectively isolate pumping unit from floor and plungers from car frame.
- .2 Prevent lateral displacement of pumping unit.
- .3 Isolate any new oil line from building structure through the use of isolation hangers or rubber.
- .4 Provide sound isolation between pumping unit and controller, motor and pump and building supports.
- .5 Limit noise from pumping unit to 70 dBA, measured on an "S" response scale, measured 1 m from unit enclosure.
- .6 Provide flexible connection in all EMT or other rigid conduit which leads to components mounted on the machine room walls.
- 2.8 Cylinder and Plunger
- .1 Remove the existing jack unit and install a complete new jack unit. Piece unit accordingly to allow easy access in to the existing hoistway. Do not perform any hoisting from the suspended car cab.
- .2 Construct piston of selected steel tubing machined true and finished to surface finish of 0.0008 mm roughness height rating or better. Telescopic plungers are not acceptable.
- .3 At top of cylinder include stuffing box and packing gland with seal or self-adjusting packing which does not require external adjustment.
- .4 Include means to automatically return oil which leaks past packing to storage tank. Filter oil if exposed to atmosphere.
- .5 Include safety bulkhead on cylinder in accordance with B44 code.
- .6 Design and install cylinder and plunger plumb. Operate with minimum friction.
- .7 Do not use a plunger follower guide.

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- .4 Provide data plate on motor showing motor connections.
 - .5 Limit starting current of elevator motor to not more than four (4) times full load running current.
 - .6 Include Class B motor insulation.
 - .7 Include manually reset integral overheating protection to CSA C22.2 No. 77.
 - .8 Design motor for 100 starts per hour.
- 2.12 Motor Controller
- .1 Provide a CSA approved modular microcomputer controller to provide solid state soft starting.
 - .2 Provide the following protection during the starting and running modes.
 - .1 Start fault.
 - .2 Line fault.
 - .3 Temperature fault.
 - .4 Stall motor.
 - .5 Provide LED indicators for advisory status and fault annunciation.
 - .6 Design controller to be capable of delivering its rated current and ambient temperatures ranging from 5 °C to 40°F.
- 2.13 Muffler
- .1 Minimize transmission of fluid pulsations in pipeline between pumping unit and cylinder head with blow-out proof muffler.
- 2.14 Oil Line
- .1 Provide new overhead piping from machine room to cylinder. Obtain Consultant's approval for location of pipe run.
 - .2 Use threaded couplings or mechanical couplings which mechanically prevent separation of adjoining members.
 - .3 Welding is permitted providing interior of pipe is thoroughly cleaned after welding or where welding method prohibits introduction of foreign material into interior of pipe.
 - .4 Provide sound isolation couplings in pipeline between pump and cylinder.
 - .5 Provide a gate valve, in the line to facilitate maintenance and adjusting of elevator.
 - .6 Locate piping where it can be serviced. Do not bury piping.

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- .7 Remove and dispose of redundant oil line.
 - .8 Provide overspeed valve at the cylinder head.
 - .1 Activate on pressure drop - not electrical connection.
 - .2 Provide adjustable flow initially set to activate at 125% of contract speed.
- 2.15 Oil Reservoir
- .1 Provide oil storage tank capacity equal to volume of oil required to lift elevator to top terminal plus reserve of not less than 10% or 40 litres, whichever is greater. Provide all new "green" fully biodegradable, elevator hydraulic fluid. Provide Viscosity Index of 190 with Flash point of 200 degrees C or better.
 - .2 Clearly indicate minimum permissible oil level.
 - .3 Include gauge glasses to indicate oil level if top of tank is more than 1.5 metres above floor level.
 - .4 Provide filtering screen mounted over the suction inlet.
 - .5 Provide a drain connection.
- 2.16 Low Oil Control
- .1 Provide low oil control feature to automatically cause up-travelling car to descend to main landing if reservoir oil level is insufficient.
 - .2 Arrange control so that oil reservoir must be refilled before elevator can be returned to service.
 - .3 Open car and hoistway doors automatically at lower landing. Inactivate control buttons in car operating panel except door open button.
- 2.17 Controller and Cabinet
- .1 Provide new solid state controller equipped with closed-loop microprocessor control and self-diagnostic features. Provide design specific to hydraulic elevator applications. Acceptable controls are non-proprietary versions of GAL (New York), MCE (California) or JRT (Quebec). Provide non-proprietary version with all required diagnostics as "on-board" including:
 - .1 All programming and diagrams required for long-term maintenance are provided with the controller.
 - .2 The controller will not shut down or alter its functionality in any way after a pre-determined increment of time or use.
 - .3 Any elevator contractor shall be allowed to purchase parts, supplies, diagrams, support or training directly

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from the factory at the same cost level as the original installer. A published price list shall be supplied with the controller.

- .4 Parts including circuit boards shall be available for direct purchase from the factory in numbers and not on an one-for-one "exchange only" basis.
- .2 Travelling to a terminal landing in order to re-establish car position after a failure is not acceptable. Stepper relays are not acceptable.
- .3 Permanently identify all switches and relays.
- .4 Do not employ components or controller logic which will disable or otherwise alter the operation of the elevator after a pre-determined number of starts, door cycles, etc.
- .5 Enclose the controller in a NEMA-1 or better enamelled, ventilated, sheet steel cabinet, with hinged-swing doors at front. Ground all elements of the cabinet including doors.
- .6 Provide relays and contactors particularly designed for elevator duty.
- .7 Provide battery back-up for all circuits containing volatile memory. Label batteries with required replacement date.
- .8 Provide a suitable communication system junction box on the outside of the controller and identify it accordingly. Provide a separate identified box for the fire alarm connection and emergency power signal.
- .9 Cord all field wiring and insulate from metal contact.
- .10 Provide protection against reverse and open phasing of main feeders.
- .11 Include properly sized primary and secondary fuses for each transformer used in the controller.
- .12 Mount all controller components, including resistors, inside the cabinets. Do not mount components on controller doors or removable panels.
- .13 Permanently identify all switches and relays. Use and engraved components and panel labels where applicable.
- .14 Provide protection against reverse and open phasing of main feeders.
- .15 Provide permanently marked junction studs in a designated area in the controller connecting all field wiring.
- .16 Include properly sized primary and secondary fuses for each transformer used in the controller.

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- .17 Design controller components for ambient environment of 0-40 degrees Celsius with non-condensing humidity of up to 95%.
- .18 Provide integral comprehensive diagnostics with indicators for critical elements of elevator status
- 2.18 Terminal Stopping Devices
- .1 Provide new automatic stopping device, arranged to bring car to a stop at the terminal landings independent of the primary device in the car.
- .2 Locate final limit switches in the hoistway, operated by the car and arranged to stop the car and prevent normal operation should the car travel beyond the zone of the normal stopping device.
- .3 Dowel final limits to rails.
- 2.19 Emergency Lighting
- .1 Provide all-new car emergency lighting and a new alarm bell.
- .2 Provide 10 Lx minimum illumination at car-operating panels for 4 hours minimum provided from a minimum of two(2) bulbs per car.
- .3 Include means of containing any leakage or spillage of electrolyte.
- .4 Arrange battery to supply alarm bell during power failure.
- 2.20 Car Frame
- .1 Provide complete new heavy-duty car frame.
- 2.21 Car Platform
- .1 Provide a structural steel platform, and install a sub floor made of two layer of 19 mm plywood or more rugged as required for class of loading.
- .2 Provide a structural steel isolation frame all around platform.
- 2.22 Passenger Car Enclosure
- .1 Include overall fluorescent ceiling lighting using electronic ballasts and 1200 mm T8 lamps. Mount tubes flush with ceiling line and cage with metal mesh. Design for light intensity measured at any point on the car floor of 120 Lx minimum. Totally enclose and conceal wiring and ballasts from view within the car.
- .2 Provide car cab clear-inside dimensions of:
5' 9" wide x 7' 7" deep x 10' 0" high.
- .3 Provide two sets of flat surfaced steel bumper rails at all non-accessible sides at a height of 4" and 24" .

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- .4 Provide raised aluminum checker-plate flooring. Paint to match wall.
- .5 Use bolts fitted with washers and lockwashers and fabric separators, if necessary, to assemble and guarantee entire structure to operate entirely free from squeaks and metallic sounds.
- .6 Fabricate ceiling with sheet steel, minimum of 12 gauge, smooth and free from defects. Emergency exit to be of same fabrication and finish.
- .7 Provide stainless steel licence holder in car to suit certificate issued by enforcing authority. Design licence holder with hidden fastening.
- .8 Provide an auto-dial, hands-free cab telephone. Provide wiring through travelling cable and terminate on junction box on the exterior of each elevator controller. Program telephone to number provided by Owner.
- 2.23 Car Operating Station
- .1 Provide new car operating station in cab with faceplate in brushed stainless steel. Provide new service cabinet covers with key-operated switches for lighting, fan, emergency light test and independent service. Provide one spare keyed switch. Provide differently keyed switches per Code 8.11.
- .2 Engrave all characters on plate and fill with enamel.
- .3 Provide DUPAR US93 LED-illuminated stainless steel floor buttons, one for each floor served. Provide flush mounted tactile identification at side of button.
- .4 Locate top floor button to be no more than 1220 mm above floor.
- .5 Provide key operated stop switch, alarm button, door open and close buttons, one three-position key switch for in-car emergency service, indicator light and buzzer for emergency recall.
- .6 Make all identification engraved in upper or lower case, Helvetica medium, minimum 10 mm filled with red or black enamel, as required.
- .7 Engrave the maximum capacity in kilograms and persons and engrave the Provincial Installation number on the car station. Engrave Emergency Service instructions per Code.
- .8 Engrave the elevator designation on the car station, 25 mm high.
- .9 Use international symbols wherever possible.

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- 2.24 Struts .1 Thoroughly examine and refurbish all headers and strut angles in hoistway for proper fastening to building structure.
- 2.25 Freight Entrances
- .1 At both floors provide new elevator entrances.
- .2 Construct door and frame for ULC rated for minimum 1 ½ fire rating.
- .3 Assume complete and undivided responsibility for entire installation including doors, frames, structural supporting angles, headers, fascias or toeguards, hangers, sills and sill support angles. Frames to suit existing thickness.
- .4 Finish entrances in prime-coat paint at all floors.
- .5 Provide support angles or other hardware required to fasten frames and entrances to openings shown on Architectural and Structural drawings.
- .6 Provide vertical bi-parting doors of #12 gauge steel or better.
- .7 Provide 25 mm Neoprene astragal on length of door edge.
- .8 Provide wired, glass vision panel in each upper door section, dimensions approximately 100 mm x 200 mm height.
- .9 Include channel or angle supports at each sill, fasten to building supports with 12 mm bolts, angles to span full width of entrance. Provide checkered steel sills, Truckable Sills.
- 2.26 Gate .1 Provide new single-section car freight gates of steel, vertical lift gate, height of 1830 mm
- .2 Provide minimum #10 gauge round wire mesh on a steel member frame. Provide baked on powder coat finish. Suitably re-enforce frame to provide a stiff and substantial gate, suitable for rigorous freight applications.
- .3 Provide dual, weighted counterbalancing for smooth and quiet gate operation.
- .4 Provide new related systems including operator, limit, chains, contact, shoes, reversing edge, counterweight, counterweight guard and rails.
- 2.27 Door Operators .1 Provide new freight door operators as follows:
- .2 Provide dual-drive operators for automatic, sequenced operation of car gates and hall doors.

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- .3 Provide smooth and quiet operation of doors and gates.
 - .4 Open and close doors in response to appropriate car or hall calls or operation of door control buttons in car or hall.
 - .5 Provide momentary-pressure door open and constant-pressure door close for door control buttons.
 - .6 Provide automatic door close operation after expiry of adjustable dwell time. Provide audible warning bell and adjust to give suitable warning without excessive noise volume.
 - .7 Provide new related systems including door limits, chains, rods, hangerbar extensions, interlocks, guide shoes, retiring cam assembly and door tension latches.
 - .8 Include for new wiring package.
 - .9 Open hoistway doors to 2/3 of travel as car gate starts to open and close car gate to 2/3 of travel as hoistway doors start to close.
- 2.28 Fascia and Toe-guards
- .1 Replace fascia and toeguard.
 - .2 Clean and paint with rust resistant paint.
- 2.29 Identification
- .1 Provide 50 mm numerals on all elevator equipment.
 - .2 Provide all necessary engraving on faceplates as required by the Consultant, in English and French, Helvetica medium, upper and lower case.
- 2.30 Independent Service
- .1 Provide independent service operation.
 - .2 On independent service, remove the car from the automatic supervisory control system.
 - .3 Arrange the circuits so that the car does not respond to hall calls.
 - .4 Cause the car to park with its doors open.
 - .5 Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up.

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- .6 Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move.
- .7 Render inoperative the normal door protective devices.
- .8 Cancel all registered car calls when the direction reverses or a car call is answered.
- 2.31 Position Indicator .1 Provide new position indicator in car.
- 2.32 Hall Fixtures .1 Provide new LED illuminated buttons . Use only Dupar US 93.
- .2 Provide an out-of-service indication for all elevators, integral with each hall station. Indication to illuminate anytime elevator is not available for normal automatic operation.
- .3 Illuminate buttons when pressed to indicate a call has been registered and retain illumination until the call has been answered.
- .4 Include door-open and door-close buttons in hall.
- 2.33 Fixture Fastening .1 Fasten all fixture faceplates including car operating station, with tamper proof screws.
- 2.34 Signal Illumination .1 Illuminate signal fixtures with intensity which produces distinct and well defined indications in daylight or dim conditions.
- 2.34 Top Of Car Operation .1 Provide on car top a new single operating fixture containing the following: an emergency stop switch, continuous pressure buttons for operating the car and a switch for making the buttons on top of the car operable. Operation from top of the car shall be obtained by simultaneous, continuous pressure of the appropriate direction button and a safety operating button after these buttons have been made effective. Locate control box to Consultant's approval. For Freight elevator and for front and rear serving elevators provide a second permanently wired but movable station to allow access to all doors.
- .2 While on Top Of Car Inspection Operation, arrange for the following:

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- .1 Movement of car shall not be possible unless all safety chain contacts are closed.
- .2 Disable automatic levelling, power door operation and signals.

2.35 Work Lights and Receptacles

- .1 Provide a duplex receptacle on top of car.
- .2 Provide two (2) metal-protected, permanently-wired, light fixtures on car top. One light to be a moveable unit to be used as a hand-held light.

2.36 Keys

- .1 At completion of Work turn keys over to Consultant properly identified. Provide twelve (12) copies of each key.
- .2 Provide key rings and engraved lamicoïd tags, identifying use of key.

2.37 Hoistway Access

- .1 Provide a Peelle unlocking box and chain at all landings .
- .3 Provide access by keyed switches where required by Code.

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PART III EXECUTION3.1 Removal of
Old equipment

- .1 Remove from site and dispose of all redundant elevator equipment.
- .2 Retain one pump, motor, valve and door operator on site as a spare until completion of modernization.
- .3 Engage a licensed handler of hazardous materials to remove and dispose of power unit oil.

3.2 Excavation

- .1 Perform any required excavate to install new PVC cylinder protection, regardless of soil, rock, water or other conditions encountered.
- .2 Remove and dispose of all redundant elevator equipment from the site. Engage a licensed handler of hazardous materials to remove and dispose of power unit oil.
- .2 Include drilling, reaming, water, water removal, vacuum truck, scaffolding and other related work and materials required for the removal of the existing cylinder and for hole improvements to accommodate the new PVC-cased cylinder.

3.3 Arrangement of
Equipment

- .1 Arrange equipment in machine room for clear passage into room.
- .2 Design equipment for use in existing space for hoistway width, depth, overhead, pit and machine room.
- .3 Arrange equipment in machine room so that equipment can be removed for repairs or replacement without dismantling or removing other equipment components.

3.4 Inspection

- .1 Before ordering equipment and preparation of shop drawings, verify all relevant characteristics of hoistway, pit and machine room.
- .2 Verify shaft and openings are of correct size and within tolerances.
- .3 Confirm electrical power is available and of correct characteristics.
- .4 Report defects in writing to Consultant.

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- .2 One coat enamel CGSB 1-GP-66M.
- .8 Clean and scrape of corrosion all retained equipment throughout the elevator installations.
- 3.9 Touch Up
 - .1 Upon completion, touch-up and restore to new conditions all factory finished surfaces where damaged or defaced.
 - .2 Replace damaged or defaced items if required.
- 3.10 Machine Room Noise Level
 - .1 Design and install the equipment so that the increase in noise level in the machine room with the elevator running does not exceed 35 dB, as measured by a sound meter located in the machine room.
 - .2 Measure this noise level at center of room using a sound level meter on the "A" scale with a "S" response.
- 3.11 Performance Requirements
 - .1 Provide adjustable dwell times, independent dwell settings for car and hall calls. Set the dwell times to 30 seconds.
 - .2 Maintain full car operating speed to within 10% of rated speed.
 - .3 Adjust elevators to provide smooth acceleration and provide a comfortable and agreeable ride to the passengers.
 - .4 Maintain floor levelling accuracy of 9 mm or better.
 - .5 Meet all above parameters while providing dependable, consistent elevator operation without undue wear or excessive maintenance over the life of the elevator installation.
- 3.12 Notifications
 - .1 Within 24 hours of final inspection by Provincial authority, provide consultant with a copy of the inspection report.
 - .2 Notify the Consultant at the following project milestones:
 - .1 Two weeks prior to commencement of work.
 - .2 On completion of cylinder in place.
 - .3 When new pumping unit is operational.

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- .4 On completion of car buttons and door operator.
 - .5 One week prior to TSSA inspection.
 - .6 On completion of any deficiencies.
- 3.13 Commissioning** .1 Designate one staff person as Contractor's commissioning manager for the project. Manager to be of Adjuster, Supervisor or Manager level or higher.
- .2 Perform and meet tests required by CSA/CAN-B44-10 Safety Code for Elevators.
- .1 Supply instruments and carry out full load and balance loads tests.
 - .2 Furnish test and approval certificates issued by jurisdictional authorities within 24 hours of their being issued.
 - .3 Provide 2 weeks advance written notice of date and time of tests.
- .3 Attend at job site meetings pertaining to the Work.
- .4 Before turn-over for customer use, test elevators as following:
- .1 Working pressure in up direction with 100% car load.
 - .2 Door timings and dwell settings.
 - .3 Operating speed, full load, up.
 - .4 Operating speed, empty car, down.
 - .5 Relief pressure setting.
- .6 During warranty maintenance period closely monitor equipment for malfunctions and track reliability. Not achieving a reliability rate of # 0.6 malfunctions per elevator per month during the three month period preceding the expiration of the warranty maintenance period will extend the warranty maintenance, including full parts and labour, on the malfunctioning elevator(s) until the 90 days reliability target has been achieved.
- .7 In the presence of the Owner, Consultant and building staff, during silent hours of the building, use trained persons to demonstrate:

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- .1 Emergency Recall and In Car Emergency Operation.
- .2 Dispatching features, Independent Service Operation and the operation of any other devices necessary for the operation of the elevators, by the building staff.