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## PART 1 - GENERAL

### 1.1 Scope of Work

- .1 This Specification covers the complete modernization of Freight Elevator **E7** located in the National Gallery of Canada (NGC), 380 Sussex Drive, Ottawa.
- .2 All equipment to be designed to meet the existing space provisions.
- .3 Provide all materials, labour, **including overtime**, design, manufacturing, inspection, and testing as required to complete the work as specified in these Contract Documents.
- .4 Arrange and pay for all permits, certificates, inspections and tests required by the governing authorities, including TSSA initial and follow up inspections.
- .5 Where a device or component is mentioned in the singular number, such references shall be understood to mean that this Contractor shall provide as many of said devices or components as is necessary for the completion of the elevator covered under this Specification.
- .6 The Contractor is responsible to include all related building work required to complete the work. Include as a minimum all of the following work listed below in Clause 1.2.

### 1.2 Related Work By Elevator Contractor Included In The Contract

- .1 **Machine Room:**
  - .1 Provide a code data plate on the controller.
  - .2 Paint machine room floor at the completion of the project using Micca, or equivalent, Industrial, epoxy/polyamine, 2 components, water based paint – Colour Grey.
  - .3 Patch flush to the floor, all redundant holes in machine room floor. Patch all redundant holes in the machine room walls relating to the elevator work.

**Related Work By Elevator Contractor Included In The Contract – cont ' d**

- .4 Retain and refurbish existing fused mainline disconnect switches if compatible with new control equipment. If not, provide new fused disconnect switches to suit new equipment.
- .5 Retain and refurbish existing 110 Volt car lighting disconnect. Provide 15 Amp fuse in the disconnect switch.
- .6 Provide new wiring from the main line disconnect switch to the new controller.
- .7 Provide as per the B44 Code, a permanent sign in elevator machine room indicating the specified temperature and humidity range requirements for the elevator equipment to ensure safe and normal elevator operation.
- .8 The supply and installation of all conduit and wiring from the elevator hoistway and machine room to the additional Recall Switch at the fire control panel in the security room.
- .9 Arrange machine room and hoistway sensors to cause a flashing signal in the car operating panel.
- .10 Provide a licence frame holder for the elevator licence to be installed on the front of the controller door. Indicate on TSSA design submission that licence will be located in the elevator machine room.
- .11 Identify the elevator hydraulic oil lines located outside the machine room or hoistway as per clause 3.19.2.5 of the B44 Code.
- .12 The Elevator Contractor is to include all regular and overtime costs relating to the operation of the elevator to assist the fire alarm contractor or electrician for the installation and testing of the fire alarm wiring and system relating to the elevator operation.
- .13 Replace existing duplex receptacles in the machine room with Ground Fault Interrupter Type receptacles.
- .14 Supply and install **one** new two tube 1220 mm long guarded energy efficient fluorescent light fixture complete with T8 lamps located to suit the new equipment.
- .15 Provide a metal maintenance cabinet in the machine room.

**Related Work By Elevator Contractor Included In The Contract – cont ' d**

**.2 Hoistway**

- .1 Thoroughly clean down hoistway and remove all materials relating to the cylinder replacement.
- .2 Thoroughly clean down the main rails to remove excessive grease and fluff.
- .3 Thoroughly wire brush all rusted components in the hoistway.
- .4 Patch all redundant holes in the hoistway including areas around hall button or position indicator fixtures where cement or blocks have been removed or altered to install new fixture boxes.
- .5 Run all new telephone, communication, elevator security and fire alarm wiring and conduit in the hoistway and to the machine room. Other Contractors will run the fire alarm conduit and wiring to the machine room. Elevator Contractor to supply and install the conduit in the hoistway for all above wiring. **All fire alarm wiring must be run in a separate conduit.**

**.3 Car Top**

- .1 Provide an updated crosshead data plate on car top as per code requirements.
- .2 Paint the elevator number and the installation number on the car top.
- .3 Paint a red and white refuge space outline on car top
- .4 Provide two (2) permanent guarded 1220 mm long two tube energy efficient fluorescent light fixtures with T8 lamps on the car top. Locate lights on a stand approximately 150 mm above crosshead.
- .5 Thoroughly wash off and paint the complete car top and crosshead.
- .6 Provide a metal safety railing on the car top. Paint railing yellow. Railing to comply with **TSSA Director's Order 245/10** and suit overhead clearances.

**.4 Pit**

- .1 Thoroughly clean pit floor before final painting.
- .2 Paint all new pit equipment including floor. Paint an outline of the refuge space in the pit.

### Related Work By Elevator Contractor Included In The Contract - cont ' d

- .3 Extend the pit ladder or provide handles to a height of 1524mm above the sill. Paint the ladder yellow in colour.
- .4 Remove the existing pit stop switch. Provide TWO new Draka EN 418 model disconnect switches, in the pit. Locate one new switch to be near top of ladder.
- .5 Replace the existing incandescent light fixtures with **four** (4) new 2 (two) tube with T8 lamps fluorescent fixtures. Mount new fixtures in a vertical position. Include cover on fixtures and locate to suit existing site conditions. Bottom of fixtures to be at least 765mm (30") above pit floor.
- .6 Replace the existing duplex receptacle in the pit with a Ground Fault Interrupter Type receptacle.

### 1.3 Related Work By Owner

- .1 The Owner is responsible for activating and de-activating all fire and / or smoke sensors in the work area that may be activated as a result of ongoing work relating to the cylinder replacement.
- .2 The Owner will provide sufficient onsite storage space in the close proximity to the work area for the cylinder, PVC casing and other major components relating to the work. If the Owner cannot provide enough storage space in the building, the Contractor will be responsible to arrange and pay for a storage trailer on site.
- .3 Supply and install six (6) wires gauge #14 from the fire alarm system to be run to the elevator machine room. The smoke sensor in the machine room and hoistway must be on the same dedicated circuit.
- .4 If the existing elevator machine room lighting is not connected to an emergency power supply, provide a battery operated emergency lighting fixture in the elevator machine room.
- .5 Supply and install a new dedicated smoke detector and related wiring in the elevator machine room and hoistway. The sensors must be on the same dedicated circuit to provide a separate signal to the elevator controller. Make all connections and alterations to the fire alarm panel to accommodate the new sensors. Coordinate with elevator contractor.
- .6 Provide the services of the building fire alarm contractor to silence the alarms and activate the fire alarm testing for all elevator related tests and inspections as required until the elevator passes final inspection by the inspection authorities.

**Related Work By Owner - cont ' d**

- .7 Provide an active telephone line monitored 24/7 compatible with hands free communication system in the elevator
- .8 At the completion of the project the Owner in co-ordination with the Elevator Contractor will be responsible for the testing and verification of the fire alarm system with the existing Fire Alarm Contractor.

**Emergency Power System**

- .9 Provide an emergency power system that complies with clause 5.14 of C282-00 Emergency Electrical Power Supply For Buildings and clause 2.27.2 of the B44 Code.
- .10 Provide a building emergency power system capable of running the elevator at contract speed and capacity. Include means of absorbing regenerative power from the elevator.
- .11 The emergency power will be provided on the same lines and the same disconnect as the normal power.
- .12 Two pairs of #14 AWG signal wires will be run from the transfer switch to the elevator controller. One pair will be spares.
- .13 One pair of wires will be shorted together giving a closed circuit to indicate that the elevator will be supplied by normal power.
- .14 The same pair of signal wires will give an open circuit to indicate that the elevator will be supplied by emergency power.

**1.4 Construction Time Frame**

- .1 **Commence work immediately upon notification of acceptance of your offer. The elevator must not be taken out of service prior to May 1, 2014 and must be returned to service with all deficiencies corrected no later than August 15, 2014. Arrange in advanced for final inspection by TSSA and consultant.**
- .2 IT IS IMPERATIVE THAT THE ABOVE CONSTRUCTION TIME FRAME IS ADHERED TO.
- .3 The bid is to include all overtime required to meet the above start and completion dates.



## 1.5 Procedure Hydraulic Elevators

- .1 After award of contract, or receipt of a letter of intent to proceed, order all materials for the May 1, 2014 start date. Complete the documentation for the Registered Design Submission to TSSA. **Provide Consultant with a copy of the completed Registered Design Submission application.**
- .2 Before any work is performed, conduct a site specific Job Hazard Analysis (JHA). Provide a copy of the report to the NGC and Elevator Consultant.
- .3 Before any construction work commences on site, suitably protect all carpeting and flooring. Protection to remain in place until turnover of the elevator. The Contractor will be responsible for cleaning or replacing any damaged or dirty flooring.
- .4 Provide the Consultant with a written copy of the Company 's Safety Procedures for the removal of an inground hydraulic cylinder. **Work is not to commence until a copy of the procedure is posted on site.**
- .5 The Contractor is to post the Company "lock out and tag out" procedures in the elevator machine room at the commencement of the work. These procedures must be followed at all times.
- .6 Provide approved type Professionally Engineered shoring scaffolding to support elevator. Do not do any hoisting from the bottom of the elevator. All hoisting and lifting must be done from a bulkhead located on top of the scaffolding. Failure to follow proper hoisting procedures will result in a work stoppage.
- .7 Provide and **leave on site**, a Professional Engineer Stamped Drawing of the proper installation of the shoring scaffolding. **The drawing must be on site before any shoring scaffolding is installed.**
- .8 Before removing the existing cylinder, check the cylinder for plumb with the main rails using a Spider Bob plumb line. The Consultant will witness this procedure. Advise Consultant in advance of the check.
- .9 Contractor to inform Consultant when elevator is shored at the top of the hoistway.
- .10 Comply fully with OHS requirements relating to confined spaces when working in the pit area when there is likely to be hazardous materials, or a presence of hazardous gas, vapour, dust, mist, smoke, or fumes or an oxygen content of less than 19% or more than 23%.
- .11 All cutting of the piston or cylinder is to be carried out with a sawzall. Noisy and odour generating work to be carried out after the NGC working hours. Work to be scheduled with the Owner.

**Procedure Hydraulic Elevators - cont' d**

- .12 Provide a fully charged approved type fire extinguisher in a readily accessible location at all times during the construction process.
- .13 When welding cylinder in hoistway, ensure that an approved type fire blanket is provided by the welder, to prevent sparks from falling down between the cylinder and PVC casing. Obtain a Hot Work permit from the Owner for any cutting, welding, grinding or for any work causing sparks or open flames.
- .14 At completion of all tests with TSSA sign off and date tests in the log book. Fill in and date the occurrence book when available.
- .15 Notify the Owner and the Elevator Consultant when the complete cylinder has been removed from the casing. Retain the redundant inground cylinder on-site until the Owner and the Elevator Consultant have examined the cylinder.
- .16 Any modifications to the building structure or contents, such as but not limited to, cutting of floor slabs, removal of cement blocks or railings to install hoisting beams, removing of ceiling tiles or panels or any modifications which may affect the integrity or appearance of the building, must be approved by the Owner and or a Professional Engineer. All changes required are the responsibility of the elevator Contractor.
- .17 Cover the complete opening between the PVC and casing with an ALUMINUM cover plate minimum 6mm thick. Securely bolt cover to pit floor. Concrete fill will also be acceptable.
- .18 The Contractor is responsible for the removal and disposal of all redundant oil and debris from the inground casing, oil line and tank. Contractor is responsible for obtaining and paying for all Provincial Ministry of Environment permits required for the removal and disposal of all oil and debris. Copies of all permits are to be provided to the Owner.
- .19 Only Provincial Ministry of Environment licenced waste oil removal Contractors are eligible to perform the waste oil removal services.
- .20 Replace all hydraulic piping with new piping and Victaulic fittings.
- .21 In order to reduce the downtime of the elevator, arrange for the TSSA inspection approximately one week in advance of the completion of the work.
- .22 Within three weeks of expected delivery of the new elevator materials to the site, the Contractor is to advise the Owner of the amount of storage room required and the delivery date to the site. The Owner may not be able to provide storage space for **all** new elevator equipment.

### Procedure Hydraulic Elevators - cont' d

- .23 The Contractor is responsible to be on site to receive all delivered elevator equipment and ensure that it is moved from public areas or the loading dock and immediately moved to the assigned on site storage area. The Contractor is responsible for providing all necessary equipment required to move the delivered material to the designated storage area.
- .24 The Contractor is responsible for all offsite storage costs.
- .25 When the elevator is removed from service, a bilingual notice stating "THIS ELEVATOR IS OUT OF SERVICE FOR MODERNIZATION / CET ASCENSEUR A ÉTÉ MIS HORS-SERVICE À DES FINS DE MODERNISATION" shall be posted at each floor. These notices should include the Elevator Contractor's name and should be securely attached to each hoistway door.

### 1.6 Hydraulic Jack Removal

- .1 The Contractor's **base bid** also includes for ALL overtime related to carrying out **ALL** noisy work, such as but not limited to, jack hammering, pumping, cutting, grinding, after normal working hours at a time acceptable to the Owner.
- .2 The Contractor's **base bid** also includes for ALL overtime related to carrying out **ALL** work causing strong odours such as but not limited to, welding, grinding, gluing and painting, after normal working hours at a time acceptable to the Owner.
- .3 The Contractor's **base bid** includes for all costs related to **all** pump-outs of the casing.

### 1.7 General Requirements

- .1 General requirements apply to all the work and are part of this section. Read in full all sections included in the specification document. Conform perfectly this work to that of the other trades. Errors, omissions or imperfections in this work will not be justified by errors, omissions, or imperfections of other trades or sub-contractors.
- .2 Before beginning work, the successful Elevator Contractor shall submit for approval detailed drawings showing complete jack unit and buffer arrangement, machine room layout, and fixtures. The Elevator Consultant shall review these drawings before commencing installation. Appropriate drawings shall also be submitted to and approved by any Municipal, Provincial and/or Federal Authorities having jurisdiction. The Elevator Contractor is to completely survey the existing hoistway and machine room to facilitate the preparation of his drawings.

**General Requirements - cont'd**

- .3 The Elevator Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including 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 unless otherwise specifically stipulated in the contract documents.
- .4 The erection of this equipment shall be performed by mechanics skilled and licenced in the installation of elevator machinery and elevator entrances. The Elevator Contractor shall provide adequate on site supervision of this work.
- .5 All elevator Contractor's employees must be neatly dressed and shall wear uniforms or coveralls with company identification logos.
- .6 The Elevator Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury or loss arising out of this contract. He shall make good any such damage, injury or loss, except such as may be directly caused by agents or employees of the Owner.
- .7 The Elevator Contractor shall remove all rubbish as fast as it accumulates. Keep the building and premises clean during the progress of the work, and leave the premises at completion in perfect condition as far as his work is concerned.
- .8 The Elevator Contractor shall not be liable for any loss, damage, or delay caused by acts of government, strikes, lockouts, riot, civil commotion, war, malicious mischief, acts of God or any cause beyond his reasonable control.
- .9 The Elevator Contractor performing work under the contract shall comply with all applicable provisions of all Federal, Provincial and local labour laws.
- .10 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 provided therein.
- .11 The Elevator Contractor shall be registered with the WSIB. During the time this contract is in force, the Elevator Contractor shall carry premises liability insurance in the amount of \$5,000,000.00 inclusive, to be covered against any claims from damage to property or for personal injury, including death, which may arise from operation under this contract, whether such operation is carried out by the said Elevator Contractor or by any Sub-Contractor or anyone directly or indirectly employed by either of them. Provide the Owner with a copy of the insurance policy when requested.

### General Requirements - cont'd

- .12 Submission of bid will be considered presumptive evidence that bidder is conversant with local facilities and conditions, requirements of the documents and of pertinent federal, 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 Owner and the Elevator Consultant without delay. Should a bidder find any discrepancy in, or omissions from any of the specifications, or be in doubt as to their meaning, he shall advise the Owner and Elevator Consultant. Bidder shall state his bid is in accordance with the specifications.
- .13 The Elevator Consultant shall have general supervision and direction of the elevator work. He is the agent of the Owner only to the extent provided in the contract documents, and when in special instances, he is authorized by the Owner so to act. He is authorized to stop the work whenever the stoppage is necessary to insure the proper execution of the contract.
- .14 The Elevator Contractor shall furnish competent men and equipment for inspecting and directing speed, load, and such other acceptance tests as the Elevator Consultant may deem advisable.
- .15 Within one month after the award of the contract, the Contractor shall submit to the Elevator Consultant a copy of the progress payment schedule. No payments will be made until the schedule is reviewed and approved by the Consultant.
- .16 The work will be thoroughly inspected by the Elevator Consultant during construction and upon completion.

### 1.8 Reference Standards

- .1 Comply with all building codes, by-laws, regulations, directives, and ordinances as set forth and mandated by Federal, Provincial, and Municipal Authorities, in effect at the time of installation.
- .2 The following Standards as a minimum shall apply:
  - .1 ASME **A17.1-2007/CSA-B44-10** Safety Code For Elevators, including latest supplements and Appendix E, Elevator Requirements For Persons with Physical Disabilities.
  - .2 B44.2.07 - Maintenance requirements and intervals for elevators, dumbwaiters, escalators and moving walks.

- .3 Ontario Building Code 2006 and the National Building Code Of Canada - 2005.

#### Reference Standards – cont'd

- .4 CSA Standard C22.1 - 09 Canadian Electrical Code Part 1.
- .5 CSA Standard B651-04 Accessible Design For The Built Environment.
- .6 CAN/CSA-B44.1/ASME A17.5 2011 Elevators and Escalator Electrical Equipment.
- .7 Technical Standards And Safety Act 2000 O.Reg 209/01, Elevating Devices Code Adoption Document and O.Reg.222/01 Certification and Training of Elevating Devices Mechanics.
- .8 Occupational Health and Safety Act and Regulations for Construction Projects O.Reg.213/91 as amended by O.Reg. 631/94. R.R.O. 1990 Reg. 834.

### 1.9 Definition of Terms

- .1 The term **Owner**, as used herein, refers to: The National Gallery of Canada (NGC) 380 Sussex Drive, Ottawa, Ontario.
- .2 The term "Elevator Consultant", as used herein refers to Priestman Neilson & Associates Ltd., 1173 Klondike Road, Kanata, Ontario, K2W 1C8 who when directed by The Owner, shall act as its agent.
- .3 The term Professional Engineer, as used herein, refers to: A Professional Engineer registered in the Province of Ontario
- .4 The term elevator Contractor or Contractor, as used herein, refers to any person, partners, firm or corporation having a contract with the owner to furnish labour and materials for the execution of the work herein described.
- .5 The term sub-contractor, as used herein, refers to any person, partners, firm or corporation having a contract with the Contractor to furnish labour and materials for the execution of the work herein described.
- .6 All terms in the specifications that are not otherwise defined shall have the definitions as given in the latest edition of the CSA-B44 Safety Code For Elevators.
- .7 The term "refurbish", shall mean to carry out all labour or modifications to parts, etc, which will result in returning the original component to a "like new" condition. All refurbished equipment must be acceptable to the Consultant.
- .8 Where the terms "furnish" or "provide" are used, it shall mean to supply and install new equipment.

- .9 The term Electrical Safety Authority, as used herein, refers to: The Electrical Inspection Authority in the Province of Ontario.

### 1.10 Bidders Compliance

- .1 Submission of the bid will be considered as presumptive evidence that the Bidder is conversant with local facilities and conditions, requirements of these documents and of the pertinent Federal, Provincial and local codes, state of labour and material markets and has made sufficient allowances in his proposal for all difficulties.
- .2 Should Bidder ' s investigation of the local codes or requirements reveal stipulations contrary to these specifications, he shall advise the Contract Officer in writing without delay. Should a Bidder find any discrepancy in, or any omissions from the specifications or tender documents, or be in doubt as to their meaning, he shall advise the Contract Officer in writing.
- .3 All Bids submitted are assumed to be in complete conformance with the specifications.

### 1.11 Payments

- .1 Progress payments will be made on a monthly basis based upon approval by Consultant of progress claims submitted by the Contractor. Submit up to date WSIB certificates and Statutory Declarations with each progress payment.
- .2 All payments will be reduced by the holdbacks required by the Construction Lien Legislation.
- .3 Approval for payment may be withheld if any of the following circumstances arise.
- .1 No invoices will be approved or paid, until a completed copy of the TSSA Design Application has been forwarded to the Consultant.
- .2 Failure to work to the agreed upon schedule.
- .3 Failure to notify the Owner of the fire alarm signals required for the elevator upgrade.
- .4 Failure to provide CAD shop drawings and machine room layouts.
- .5 Failure to post a copy of the Contactor ' s Health and Safety "Lock out & Tag out" procedures in the machine room next to the mainline disconnect switch.
- .6 Damage to the building by the Contractor or any of his sub Contractors.
- .7 Defective work or deficiencies not corrected in an acceptable manner.

- .8 Failure to provide Operation and Maintenance Manuals before turnover of the elevator.

**Payments – cont'd**

- .9 Failure to comply with the specifications and or performance criteria.
- .10 Final payment will not be approved until ALL deficiencies are corrected.
- .11 Failure of the Contractor to provide the services of a licensed elevator technician to assist with all TSSA and Consultants inspections until ALL deficiencies are corrected in an acceptable manner and the final certificate of completion has been provided.
- .12 A minimum of \$5,000.00 will be held back from the final invoice until all deficiencies are corrected in an acceptable manner and a CLEAR TSSA report has been provided.
- .13 Failure of the Contractor to make payments as required to the sub-Contractors, or for materials and labour.

**1.12 Description of System**

- .1 The characteristics of the **existing E7** elevator are as follows:

.1	<b>Classification:</b>	Freight Class General Freight Loading
.2	<b>Rated Net Capacity:</b>	3629 kg.
.3	<b>Rated Speed:</b>	.51mps.
.4	<b>Installation No.</b>	38069
.5	<b>Travel:</b>	From G level to G2 level a distance of <b>approximately 12.7m</b>
.6	<b>No. of Stops:</b>	Three (3)
.7	<b>No. of Openings:</b>	Three (3) Front
.8	<b>Pit Depth:</b>	2108mm
.9	<b>Clear Overhead</b>	Retain existing

**CONTRACTOR TO CONFIRM ALL MEASUREMENTS AND INFORMATION ON SITE**



### 1.13 Non-Proprietary Controls

- .1 Provide a GAL Galaxy elevator controller, complete with a monitor on the controller door.
- .2 The elevator control system shall not require any external Proprietary service tools for maintenance or adjustments.
- .3 The elevator control system shall be serviceable and maintainable by any qualified elevator maintenance provider capable of maintaining elevator equipment of similar design and complexity.
- .4 **The Elevator Contractor is to provide all information, and special tools to the Owner that is required for the safe and efficient maintenance of the elevator equipment, including any solid state equipment, software or devices supplied under these specifications. The supplier is not to refuse any information, or the supply of parts, at fair market value, that is required by the Owner's Maintenance Contractor.**

### 1.14 Simplex Selective Collective Automatic Operation

- .1 Provide a micro-processor based selective collective control system.
- .2 Dispatch car to corresponding landing upon momentary pressure of car or hall call buttons.
- .3 Provide separate time delays for car and hall calls to enable passengers to enter or leave the car. Hold car for preset interval at landings where stops are made. Time delays to be adjustable from 0 to 15 seconds. Cancel interval upon registration of car call or pressure on door close button.
- .4 Stop car at landings for which car calls are registered. Make stops in order in which landings are reached, regardless of sequence in which buttons are registered.
- .5 If no car buttons are registered and car starts UP in response to several DOWN calls, proceed to highest DOWN call and reverse to answer other DOWN calls. Similarly, when car starts DOWN in response to several UP calls proceed to lowest UP call, and reverse to answer other UP calls.
- .6 If the car stops for a hall call and a car call is registered corresponding to the direction the car was travelling, proceed in same direction regardless of other registered landing calls.
- .7 If DOWN hall calls are registered while car is travelling UP, do not stop for these calls but allow calls to remain registered.
- .8 After highest car and hall calls have been answered, reverse car automatically and respond to DOWN car and hall calls.
- .9 When no hall or car calls have been registered for a period of sixty (60) seconds return elevator to the bottom landing and park with doors closed.

### 1.15 Next Floor Emergency Stop Feature

- .1 In the case of over speed due to maladjustment of equipment, stop elevator at next floor.

### 1.16 Firefighters' Emergency Operation

- .1 Provide AUTOMATIC "Firefighters' Emergency Operation" in accordance with Clause 2.27.3 of the CSA-B44 Elevator Safety Code and the National Building Code of Canada. **NOTE:** The main lobby (designated level) is sprinklered.
- .2 **Key Switches and Indicators**
  - .1 Provide within sight of, and readily accessible, at the designated level for each single elevator or for each group of elevators, a three position recall key switch.
  - .2 The switch shall be labelled "FIRE RECALL" and engraved in Red lettering a minimum 5mm high. Fill with black coloured permanent epoxy paint, the identification "RESET" - "OFF" - "ON" in that order.
  - .3 All signage and engraving to be bilingual – text to be approved by NGC.

### 1.17 Fire Operation Panel

- .1 The "FIRE OPERATION" switch, the "CALL CANCEL" button the "STOP" switch, the door open button(s), the door close button(s), the additional visual signal and the operating instructions shall be grouped together at the top of a main car operating panel behind a locked cover.
- .2 The firefighters' operation panel cover shall be openable by the same key that operates the "FIRE OPERATION" switch. The cover shall be permitted to open automatically when the car is on Phase I Emergency Recall Operation and at the recall level.
- .3 When the key is in the "FIRE OPERATION" switch, the cover shall not be capable of being closed. When closed, the cover shall be self-locking. Where rear doors are provided, buttons for both the front and rear doors shall be provided in the firefighters' operation panel. The door open and door close buttons for the rear entrance shall be labelled "OPEN REAR" and "CLOSE REAR".
- .4 All buttons and switches shall be readily accessible, located not more than 1800 mm (72") above the floor. The front of the cover shall contain the words "FIREFIGHTERS' OPERATION" in red letters at least 10 mm (0.4") high.

### 1.18 Firefighters' Operation Instructions

- .1 Instructions for the operation of the elevators on Phase I Emergency Recall shall be permanently incorporated with, or adjacent to the "FIRE RECALL" switch at the designated level. The wording of the instructions shall comply with wording only as shown in figure 2.27.7.1 of the CSA-B44 Code.
- .2 Instructions for the operation of the elevators on Phase II Emergency In-Car Operation shall be permanently incorporated on the rear of the fire panel door. The wording of the instructions shall comply with wording only as shown figure 2.27.7.2 of the CSA-B44 Code.
- .3 The instructions shall be in letters not less than 3mm in height and shall be permanently installed and protected against removal or defacement.
- .4 All instructions shall be bilingual.

### 1.19 Firefighters' Emergency Operation Key - FEO-K1

- .1 Provide a Dupar firefighters' operation key (FEO-K1).
- .2 The key shall be of a tubular type, 7-pin, style 137 construction and have a biting code of 6143521.
- .3 The same FEO-K1 key shall operate the elevator emergency power selector switch, the fire recall switch and fire operation panel door.
- .4 The key switches shall comply with Clause 2.27.8 and be of the Group 3 Security.

### 1.20 Elevator Identification

- .1 Provide 100mm numerals corresponding to floor level on inside of hoistway doors.
- .2 Provide 50mm numerals on all elevator equipment as previously specified. Include permanent numbers engraved in the elevator.
- .3 Provide all necessary engraving on faceplates as required by the Consultant, in English and French, Helvetica medium, upper and lower case.
- .4 All fastenings of cover plates for signals, buttons and panels shall be tamper proof type.
- .5 Identify the elevator at recall level. Use metal plates permanently installed with rivets or a permanent type glue. Numbers to be minimum 50mm high.
- .6 Provide raised character and braille floor designations on both door jambs minimum 50mm. Locate centre-line of numeral 1525 mm above floor level measured from the base line of the characters.

### Elevator Identification - cont'd

- .7 At the main entry level on both door jambs provide a 50mm raised star designation to the left of the floor designation number. All characters to comply with Clause E19.2.
- .8 Provide at each floor, bilingual, Elevator Corridor Call Station Pictograph as per figure 2.27.9 of the B44 Code.
- .9 **Floor Numbers**
  - .1 Stencil and paint floor numbers, not less than 100mm in height, on the fascia and inside of the hoistway doors.

### 1.21 Elevator Performance

- .1 Provide smooth acceleration and deceleration of car without perceptible steps so adjusted as not to cause rider discomfort.

### 1.22 Shop Drawings

- .1 Submit shop drawings as required.
- .2 Indicate on shop drawings as a minimum the following information: Provide all information as required by the CSA B44 Code.
  - .1 Top and bottom clearance and over-travel of car.
  - .2 Outside diameter and wall thickness of cylinder, plunger and piping, and working pressure.
  - .3 Length of plunger, cylinder and PVC casing.
  - .4 Rupture valve.
- .3 Each drawing submitted shall bear stamp of qualified professional engineer registered in the Province of Ontario.

### 1.23 Record Drawings

- .1 Provide record drawings as described below.
- .2 In addition, provide schematic wiring diagrams, including all changes made in final work, covering electrical and solid state equipment as supplied and installed, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
- .3 All changes to the wiring diagrams must be marked up in RED and stamped by a Professional Electrical Engineer.

### Record Drawings - cont'd

- .4 Provide a letter from a Professional Engineer confirming that the marked up drawings are complete and are "as built".
- .5 Provide an electronic copy of the final "as built" wiring diagrams.
- .6 Neatly organize and laminate all electrical drawings.

### 1.24 Operation and Maintenance Manuals

- .1 Provide all information necessary for the safe and efficient maintenance of the equipment and incorporate into the maintenance manual. Provide three (3) sets of manuals. One additional complete manual to be left in the elevator machine room and identified on the cover as MACHINE ROOM COPY.
- .2 The maintenance data must include the following information:
  - .1 Description of system's method of lubrication, operation and control including, video monitor, motor control system, door operation, signals, fire-fighter's service, emergency power operation, and special or non-standard features provided.
  - .2 As built schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus.
  - .3 Copies of T.S.S.A. Design Submission and Final Inspection Report. Copies of the Electrical Safety Authority Inspections.
  - .4 Copy of the emergency power test affidavit confirming that a full load was placed in the elevator for the test. Include the date of the test.
  - .5 Parts catalogue giving complete list of repair and replacement parts with cuts and identifying numbers.
  - .6 Provide the diagnostic or service tool access code number assigned to each elevator.
  - .7 Provide a complete copy of the Maintenance Control Program (MCP) in the manuals.

## 1.25 Maintenance Service

### .1 Interim & Long Term Maintenance Program

- .1 The Contractor shall **INCLUDE** and provide full interim maintenance service, including overtime, for the elevator commencing one month after the signing of the elevator modernization contract, and to coincide with the first day of the start of a month, The maintenance term will commence after the issuance of the final certificate of completion of the modernization project. The maintenance term will terminate on August 31, 2015. **Include** the cost of the interim period maintenance in the base tender price.
- .2 **Provide a separate monthly cost for maintenance until August 31, 2015.**
- .3 Perform all Tests and Examinations as required by Section 8.6 of the B44 Safety Code For Elevators and the B44.2.07 - Maintenance requirements and intervals for elevators, dumbwaiters, escalators and moving walks. The frequencies specified in the B44 Code are a minimum. Should on-site conditions or manufacturers recommendations require more frequent procedures they shall be increased accordingly.
- .4 Maintenance to include **monthly** systematic examination, cleaning, adjustment and lubrication of elevator equipment and the repair or replacement all defective parts due to normal wear and tear. Use only genuine parts produced by the manufacturer of the equipment.
- .5 Perform work at a minimum frequency of one visit per month; do not remove the elevator from service during peak traffic periods.
- .6 The preventive maintenance is to be carried out in full compliance with the existing National Gallery preventive maintenance specifications. Provide 24 hours, 7 days a week call back service at no additional charge to the Owner. Breakdown of freight elevator E7 during the movement of art for installation and takedown of Exhibitions requires a 1-hour response time.
- .7 Maintain locally, near the place of work, an adequate stock of parts for replacement or emergency purposes. Have qualified personnel under the supervision and in the direct employ of the Contractor available to ensure fulfilment of this maintenance service without unreasonable loss of time.
- .8 Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Owner.
- .9 Maintain in the elevator machine room one (1) copy of the schematic wiring diagrams covering electrical equipment as supplied and installed, including changes made in final work, with a list of symbols corresponding to identification or markings on both machine room and hoistway apparatus. Cover in plastic or laminate diagrams.
- .10 Provide in the elevator machine room a metal cabinet for the storage of approved lubricants and cleaning supplies. Provide a metal covered storage can for waste and oily rags.

**Maintenance Service - cont' d**

- .11 **Provide a Maintenance Control Plan (MCP) as per CAD Part 3.1 - Clause 8.6.1.1.1. The MCP is to remain in the elevator machine room.**
- .12 The log shall be the property of the Owner and shall be kept on the job site and available at all time for the Owner's verification.
- .13 Make all entries in ink, legibly, consecutively and without blanks.
- .14 Computerized entries are not acceptable.
- .15 Adjust the control system for optimum operation towards the end of the maintenance contract when the building is occupied.
- .16 The monthly maintenance will not be paid by the Owner while the elevator is out of service for the modernization.
- .17 Should the existing elevator maintenance contractor be awarded the modernization project, the existing preventive maintenance contract will remain in force including the monthly maintenance cost indicated in the original preventive maintenance contract. Clause 1.25.16 still applies.

**1.26 Independent Service Operation**

- .1 Provide independent service operation by means of a key operated switch in the car to allow the car to operate independently in response to car calls only.
- .2 Park the car with the doors open, and respond to a selected car call by constant pressure on the door close button, provided, that the doors have been closed and the interlock is made-up. Arrange for the doors to reopen if the constant pressure on the door close button is released at any point prior to the car starting.
- .3 Place the direction of travel under the control of the attendant. Arrange the operation to cancel all registered car calls, and bi-pass registered hall calls. Do not operate hall lanterns when stopping at a floor.

**1.27 Power Supply**

- .1 The existing 600 Volt power supply will be retained.

### 1.28 Existing Electrical Services

- .1 The Elevator Contractor shall design his equipment to operate using the existing 3 phase power supply. The voltage supply may fluctuate by  $\pm 10\%$ .
- .2 The Elevator Contractor shall be responsible for providing a true earth ground, shielding, or bonding as required to suit the new elevator equipment. The true earth ground wire is to be the same size as the feeder wires.
- .3 **Any modifications carried out to the existing electrical systems relating to the elevator modernization project such as: new pit or machine room lighting-secondary level lighting-installation of GFI receptacles and all new wiring and piping from the mainline disconnect to the transformer must be carried out by a licensed electrician. The electrician must take out a Hydro permit before the work commences.**
- .4 All electrical new or modification work is to be inspected by the Electrical Safety Authority at the completion of the work. A copy of the inspection report must be provided to the Consultant. The electrical Contractor is responsible to pay the costs of the permit and inspection fees.

### 1.29 Warranty

- .1 Warrant that the materials, the performance and workmanship are first class in every respect and make good any defects not due to ordinary wear and tear or improper use, which may develop within one (1) year from the date of acceptance of the equipment.
- .2 Warrant that the equipment performs to the standard set out herein.
- .3 The use of the elevator during the construction period shall not affect this warranty.
- .4 Neither the final payment nor any provision of the Contract documents relieves the Contractor of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law.
- .5 Upon written notice remedy any defects and pay all expenses for any damage to other work resulting from the defects.
- .6 Provide an in ground cylinder warranty letter as worded below before the certificate of final completion is issued. A copy of the letter is to be included with the maintenance manuals or design submission.



**Warranty - cont' d**

- .7 As long as we are maintaining the elevator “ *We guarantee that the material and workmanship of the buried components installed under these specifications are first-class in every respect. We will repair or replace any or all of the components as required, at no additional cost to the Owner, should any faults be discovered for a period of twenty (20) years from the date of final acceptance. This warranty excludes any damage due to improper use, misuse or neglect of the elevator equipment by the owner*” .

**1.30 Markings**

- .1 No trademarks shall appear on any piece of equipment visible to the general public.

**1.31 Use of Elevators For Persons with Physical Disabilities**

- .1 Where possible, comply with the requirements of Appendix E of the CSA-B44 Safety Code For Elevators and all other governing codes and regulations.

**1.32 Preliminary Details**

- .1 The Contractor shall submit, within 15 working days after award of the contract, all information and details required for the work to be performed by others in conjunction with the modernization of the equipment.
- .2 Within one month after award of contract, or receipt of letter of intent, provide Consultant with a copy of the Registered Design Submission Application to TSSA.

**1.33 Schedule and Cost Breakdown**

- .1 Within three (3) weeks after award of the contract submit, to the Owner and Consultant for approval, a bar chart schedule indicating anticipated progress stages.
- .2 Include in this schedule, the following information:
- .1 Submission of shop drawings after award of contract.
  - .2 Submission of TSSA Design Submission Application.
  - .3 Modernization time for the elevator.
  - .4 Adjustment time for the elevator.
  - .5 Final adjustment and testing time for the elevator
  - .6 PNA Acceptance inspection and correction of deficiencies
  - .7 The date of completion of all work.

### Schedule and Cost Breakdown - cont' d

- .3 During the course of the modernization submit a **BI-WEEKLY** progress report to the Consultant indicating the percentage of work completed for labour and material. **The reports are also to indicate the dates that the Owner was advised of the fire alarm, machine room air conditioning and telephone line requirements. Failure to submit this bi-weekly report will delay the payment of the progress claims.**
  
- .1 Submit a cost breakdown indicating the percentage and dollars value of the costs for the items listed below as a minimum.
  - .1 Engineering and TSSA submittals (Maximum 5%)
  - .2 Building related work
  - .3 Total labour
  - .4 Machine, controller and pumping unit
  - .5 Hoistway door equipment and wiring
  - .6 Fixtures
  - .7 Adjusting and TSSA inspections
  - .8 Operation and Maintenance Manuals
  - .9 Correction of deficiencies
  
- .4 Provide one week's notice prior to the completion of the elevator and the date anticipated for the inspection.
  
- .5 Review and update the work schedule as the completion of the work progresses and notify the Consultant in case of modification.
  
- .6 If the work falls behind the schedule, take action as necessary to meet the schedule, including, but not limited to, extra personnel and overtime work at no additional cost to the Owner.
  
- .7 Pay costs associated with this action unless the delay is caused by strikes, acts of government, riot, civil commotion, war, malicious mischief, act of God or any causes beyond the control of the Contractor.

### 1.34 Finishes

- .1 Unless otherwise specified, paint machinery equipment with oil resistant paint. All painting on-site to be done after the NGC's business hours.
- .2 Remove rust on all elevator structural parts and paint same with rust resistant paint.

### 1.35 Painting

- .1 Ensure that all equipment, except for machined surfaces of the machines and guiding rails are protected with two coats of rust inhibiting primer of a neutral colour.
- .2 All necessary touch ups for damages caused during handling of the equipment are to be made on site.
- .3 All paint to be approved by the Owner.

### 1.36 Occupied Premises and Barricades

- .1 Take into consideration the fact that this is an occupied building and must continue to function during the course of the work with a minimum of disruption.
- .2 Employees shall be appropriately attired, be courteous to the occupants and abide by the same building rules and regulations required of the occupants.
- .3 All work must be performed in a manner that ensures the safety of the occupant and the user of the operating elevators. Should it be necessary to perform work where such safety cannot be ensured, it shall also be performed at a time acceptable to the Owner and during hours other than normal building business hours at no additional cost to the Owner.
- .4 Provide full height barricades as required to protect the Public from hazardous conditions. Obtain Owner's approval for the appearance of all barricades erected.
- .5 The bottom floor hallway in front of the elevator must be accessible to the building occupants at all times.
- .6 Access to mechanical room 3131 must remain accessible to building operators.

### 1.37 Health and Safety Requirements

- .1 Comply with National Building Code Of Canada 2005 (Part 8, 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.

### 1.38 Powder Actuated Fastening Devices

- .1 Do not use powder actuated tools using explosives, unless permitted expressly by the Consultant and approved by the Owner.

### 1.39 Overtime Work Included

- .1 Contractor to include in the Tender for all costs related to any overtime work required to complete the work specified herein, including the time frames indicated and assisting Fire Alarm contractor or Electrician relating to the new elevator work.
- .2 Carry out any odour or noise generating work such as interior painting, all welding, core drilling, jack hammering, saw cutting, grinding after normal working hours of the building and at a time which is acceptable to the Owner. Thoroughly arrange to ventilate areas painted during "off hours". The Contractor is to provide smoke eaters to reduce odours.

### 1.40 Technical Seminar

- .1 Upon completion of the work, provide two (2) seminars for the Owner's staff. Seminars are to be provided in English and French, if required.
- .2 The seminar shall include a complete review of all documentation, operation of equipment, and demonstration of special features. Allow a minimum of four (4) hours for each seminar.
- .3 Provide Owner or Owners representative, with a laminated copy of the detailed procedures for resetting the Firefighters' Operation from the main and duplicate switches.

### 1.41 Keys

- .1 Provide six (6) sets of keys for each control device and three (3) sets of keys for Firefighters Operation.
- .2 All keys shall be grouped as per clause 8.1.1 of CSA-B44 Code.
- .3 Organize keys on suitable key rings with permanently engraved tags, clearly identifying use. Tags to be approved by, and presented to the Owner's representative.
- .4 Provide Consultant with a copy of a Transmittal signed by Owner's Representative indicating that all tagged keys have been received by the authorized representative.
- .5 Provide a copy of the Transmittal in the maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 Components

- .1 The following major components as a minimum, shall be replaced with new equipment as specified herein.
  - .1 Complete Hydraulic Jack Unit
  - .2 All hydraulic fluid
  - .3 All hydraulic piping
  - .4 Pumping Unit
  - .5 Electrical controller
  - .6 All wiring
  - .7 Top of car control box
  - .8 Hoistway levelling system
  - .9 All limit switches
  - .10 Car and hall operating fixtures
  - .11 Car gate operators
  - .12 Hoistway door locking equipment
  - .13 Hoistway door operators

### 2.2 New Components

- .1 Use major elevator components from standard product line of one manufacturer unless otherwise approved by the Consultant. Major components include jack unit, pumping unit, and PVC piping.
- .2 All materials and equipment shall be new. Furnish samples as directed by the Consultant.
- .3 Use components only which have performed satisfactorily together under conditions of normal use in not less than three (3) other elevator installations of similar design and for a period of at least three (3) years.

### 2.3 Basic Materials and Design

- .1 Include basic materials as follows:
  - .1 ASTM Standard, A480M-99 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
  - .2 Hydraulic pipe and fittings: CSA-B44.

## 2.4 Wiring, Conduit and Fittings

- .1 Provide **all** new CSA - B44 approved insulated wiring for all equipment.
- .2 Install all new wiring according to prevailing B44 Code requirements.
- .3 Provide insulated wiring having a flame retarding and moisture resisting outer cover. Run the wires in metal duct.
- .4 Use steel compression type fittings where electrical metallic tubing is used. Fittings with setscrews are not acceptable unless a separately identified grounding conductor is also installed in the raceway.
- .5 Do not use armoured flexible metal conduit as a grounding conductor.
- .6 Provide and connect all hoistway wiring, travelling cables, car wiring, etc., and all remote alarm indicators or other similar items, from the device to terminal blocks mounted on the controller.
- .7 Provide a separate identified junction box, mounted on the side of the controller in the machine room, with terminals for the connection of "non elevator" devices, such as telephones, card reader interface and connect from the elevator controller to this junction box, as required.
- .8 Provide ten percent (10%) additional minimum spare wires. Tape the ends of the wires and properly and legibly identify all spare wires.
- .9 Check all wires, including spares, for continuity and grounds, and mark each wire by a number and each group as to destination.
- .10 Mark all connections on intermediate terminal blocks with corresponding numbers.
- .11 Where provided, ensure all flexible conduit is aluminum type.
- .12 Mark all individual wires by numbered adhesive waterproof markers. Identify wires of multi-wire cables by colour code.
- .13 Limit the use of flexible conduit on the car top to only those items that require movement or periodic adjustment. Use of excessive flexible conduit on car top will be rejected.
- .14 All flexible conduit that rests on the car top must be installed in a unistrut which is at least the same height as the conduit.
- .15 Connect all wiring where required to the building fire alarm system.

### Wiring, Conduit and Fittings - cont ' d

- .16 Label all terminal and junction boxes as to their function with permanently attached waterproof labels.
- .17 Label group of wires and multi-wire cables and mark all terminals with waterproof markers.
- .18 Provide stranded field wire with no splices.
- .19 Attach to the controller a legible list, neat and waterproof, showing wiring runs, colour codes, and numerical codes.
- .20 Provide a supplementary, uninterrupted shielded cable running from machine room to the elevator, containing a sufficient number of shielded wires for eventual connection of security video camera.
- .21 Provide additional auxiliary disconnect switches and wiring as required, to suit the machine room layout.
- .22 The maximum number of conductors of one size in conduit or tubing must be in compliance with Table 6 of the Canadian Electrical Code. The maximum allowable per cent conduit and tubing fill must be in compliance with Table 8 of the Canadian Electrical Code.
- .23 Do not run any wiring or conduit on the pit floor. Install all wiring and conduit a minimum 600 mm above pit floor. Securely fasten and brace any conduit which runs across the hoistway above the floor.
- .24 Provide a separate identified green ground wire to all switches and components connected by flexible conduit, such as, but not limited to, hoistway door locks, car gate switch, hall and car push buttons and limit switches.
- .25 The conductors from the controller to the hoistway door locks shall meet the requirements of Rule 2-126 and Clause 38-011 of the Canadian and Ontario Electrical Safety Codes. The wiring must be rated for 200° Centigrade and be of the SF type or equivalent.

### 2.5 Travelling Cables

- .1 Replace **all** travelling cables with new CSA-B44 approved flexible travelling cable designed specifically for elevator use. Provide type ETT cables.
- .2 Terminate cables on terminal blocks having identifying numbers to facilitate replacement and service.

### Travelling Cables - cont ' d

- .3 Provide travelling cable with flame retarding and moisture resisting outer covers.
- .4 Suitably suspend the travelling cables to relieve strain in the individual conductors, (using a steel supporting strand with appropriate supports if the suspended weight exceeds 34 kg).
- .5 Provide ten percent (10%) additional minimum spare wires in each travelling cable.
- .6 Provide in the travelling cables, at least five (5) pairs, uninterrupted shielded wires and one (1) coaxial cable for future electronic equipment.

### 2.6 Guide Shoes

- .1 Retain and refurbish existing guide shoes.

### 2.7 Guide Rails and Fastenings

- .1 Check rail alignment and plumb same within maximum variation of 1.5mm over any 6.1m section.
- .2 Check all fastenings, brackets and fish plates to ensure secure and solid attachment of rails.
- .3 Thoroughly clean car guide rails to ensure smooth operation of the roller guides.

### 2.8 Intermediate Beams

- .1 Check all intermediate beams and brackets for secure fastening to hoistway structure. Securely fasten any loose brackets or beams.

### 2.9 Spring Buffers

- .1 Provide new spring buffers and support channels. Provide data plates on buffers.
- .2 Ensure that buffer springs are securely fastened in place.



## 2.10 Open Door Inspection Operation

- .1 Provide in controller switches marked "CAR DOOR BYPASS" and "LANDING DOOR BYPASS".
- .2 Provide circuitry that will prepare the control system so that, when an inspection operation is activated, the car may be moved with open door contacts in accordance with clause 2.26.1.5 of the CSA-B44 Safety Code For Elevators.

## 2.11 Top of Car Inspection Operation

- .1 Provide Top-Of-Car Inspection operation with open door circuits in accordance with clause 2.26.1.5 of the CSA-B44 Safety Code For Elevators.

## 2.12 Limit Switches

- .1 Replace all slowdown and final limit switches. Provide new wiring to all switches.
- .2 Dowel final limits to brackets after final adjustment.

## 2.13 Controllers and Cabinets

- .1 Remove existing controllers and cabinets and provide new controller enclosed in enamelled, ventilated, sheet steel cabinet. Include hinged doors for easy access.
- .2 Provide contacts to insure maximum conductivity with a wiping action to prevent sticking and fusion.
- .3 Provide electronic time delay devices, which employ stable capacitors or crystals as time base.
- .4 Wiring on the controller, whether control or field wiring, must be done in neat, workman like order and all connections made to studs and terminals by means of grommets or similar connections.
- .5 All relays, contactors, fuses and printed circuit board components, etc., shall be clearly marked by means of tags not easily removable.

## 2.14 Computing Devices

- .1 Isolate the inputs to micro-processors from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices.
- .2 Provide the control program on read-only-memory with a minimum of 40% spare capacity, to allow for future programming modifications and extension.
- .3 Provide for separate regulated power supplies to serve the micro-processor system.

## 2.15 Selector

- .1 Replace existing mechanical selector with a hoistway car position system, electrically coupled to the controller.
- .2 Design system to provide the controller with precise information as to the absolute position of the elevator within the hoistway.
- .3 Provide solid state devices, pulse generators, or magnetic switches, in combination with a fixed steel tape, for position and direction indication, speed reduction, levelling, door zone and related signals.
- .4 Do not use electro-mechanical stepper switches.
- .5 Design the unit so that the parts are readily accessible for replacement and adjustment.

## 2.16 Hoistway Switches

- .1 Hoistway switches shall be silent in their operation and inaudible to passengers in the car with the fan turned off.

## 2.17 Solid-State Hardware

- .1 Mount solid-state devices, except for high power silicon controlled rectifiers and rectifiers, on removable printed circuit boards.
- .2 Gold plate the contact points of edge connectors.
- .3 Provide plated through holes for double sided boards.
- .4 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- .5 "Patched" connections will not be accepted.
- .6 Design solid-state devices for a high load of noise immunity.
- .7 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.

## 2.18 Control Circuit Grounding

- .1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.

## 2.19 Power Unit

- .1 Provide one new ITI Hydraulik **DRY**, fully enclosed self-contained unit with structural steel base to support the storage tank, and with an integral oil-tight drip pan with drain. Mount the unit assembly on 25mm minimum vibration isolators. Provide a removable metal guard for the drive belts. Paint guard yellow.
- .2 Provide one positive displacement pump of the direct drive screw type, designed especially for oil-hydraulic elevator service, delivering a steady discharge with minimum pulsation. Design for mechanical efficiency of at least 85% under full rated load, with no more than 10% variation between no load and full load on the elevator.
- .3 Provide a thermostatically controlled tank heater.
- .4 Provide a master oil control valve unit assembly comprising:
  - .1 Relief valve - externally adjustable, capable of bypassing the total oil flow without increasing back pressure more than 10% above that needed to barely open the valve.
  - .2 Check valve - designed to support the fully loaded elevator at rest on a column of oil, and to close quietly without allowing any perceptible reverse flow.
  - .3 Up-start valve - externally adjustable, and designed to bypass oil flow during initial start to relieve load on the motor; to close slowly and to provide for smooth Up-starts.
  - .4 Up-level valve - externally adjustable, and designed to assure smooth Up-stops through bypassing oil flow.
  - .5 Down valve - externally adjustable, and designed to control acceleration, lowering speed, down-levelling speed as well as stopping, so as to provide for smooth starts and stops in the down direction.
  - .6 Manual valve - designed for manual lowering of the elevator car.
  - .7 Shut-off valve - designed to isolate oil in the storage tank and permit adjusting the elevator without having to remove oil from the tank.
  - .8 Strainers - of the self-cleaning type, and designed to prevent fouling the control valve system.

**Power Unit – cont'd**

- .5 Construct the storage tank of welded sheet steel complete with a tight fitting cover, a protected vent, an oil level gauge, a drain and a filtering screen over the suction inlet. Provide for storage capacity equal to the volume needed to lift the elevator to the top landing, plus more than 90 litres reserve.
- .6 Provide blowout-proof mufflers in each oil line, designed to minimize hydraulic pulsations and to deliver quiet operation. Limit the increase of ambient noise in the cab to under 4dBA when the elevator travels either UP or DOWN anywhere in the hoistway.
- .7 Provide an Overspeed valve as per clause 3.19.4.7 of the B44 Code. Provide a **threaded connection** from the Overspeed Valve to the Jack.
- .8 Provide a mainline strainer of the self-cleaning type in each oil line, with a 60 mesh element and a magnetic drain plug.
- .9 Use supporting isolators for all piping in the machine room, hoistway and pit. Where piping penetrates a wall, provide resilient sleeves to prevent direct contact.
- .10 Provide hydraulic oil with a minimum flash point of 204 degrees C and viscosity of approximately 30 seconds at 37.5 degrees C.

**2.20 Motor**

- .1 Design pump motors for a **minimum of 80 starts** per hour.
- .2 Do not exceed CEMA design B locked rotor current.
- .3 Design for minimum locked rotor torque of 150% and minimum breakdown torque of 200% at normal voltage.
- .4 Provide data plate showing motor connections.
- .5 Limit starting current of elevator motor to not more than 3 times full load running current.
- .6 Provide Class F motor insulation.
- .7 Include manually reset overload protection in accordance with Canadian Electrical Code, CSA C22.1 - 1998, 38-038 for all motors subjected to elevator use.
- .8 Provide thermal overload protection for motor.
- .9 Protect motor against damage caused by transfer of power from or to emergency power supply.
- .10 Design the equipment to operate at plus or minus 10 percent variation of supply voltage and 3 percent variation of supply frequency, without affecting elevator performance. Provide protective devices for over-voltage and under-voltage conditions.
- .11 In the pump motor controller provide a means to detect an increase in the rise of the oil temperature in the hydraulic driving machine above its maximum operating

temperature. Comply with Clause 3.26.6. 5 of the Code.

## 2.21 Solid State Motor Controllers

- .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
- .3 Provide LED indicators for advisory status and fault annunciation.
- .4 Design controller to be capable of delivering its rated current in ambient temperatures ranging from 0°C to 50°C.

## 2.22 Low Oil and Temperature Control

- .1 Provide low oil and temperature control feature designed to automatically cause up-travelling car to descend to lower terminal landing if reservoir oil level is insufficient or if the oil temperature rises above manufacturer ' s recommendations.
- .2 Open car and hoistway doors automatically at lower terminal landing Inactivate control buttons in car operating panel except for the door-open button.
- .3 Provide an automatic reset.

## 2.23 Car Stall Protection

- .1 Automatically return car to bottom landing and open power operated doors if car should stall as result of relay failure, or valve failure while ascending. Restore service by opening and closing main line switch.

## 2.24 Two-way Levelling

- .1 Include automatic two-way levelling device. Approach landing stops at reduced speed from either direction of travel.
- .2 Level with accuracy of 6 mm under varying load conditions.

## 2.25 Temperature Control

- .1 Install thermostatically controlled heaters or other means to maintain fluid viscosity within limits necessary to provide consistent, reliable operation at all times.

## 2.26 Emergency Power Operation

- .1 Provide automatic emergency power operation including indicator light at recall level

and all engraving as required.

## 2.27 Buried Cylinder Protection

- .1 Encase buried cylinder in a protective plastic casing immune to galvanic or electrolytic action, salt water and other known underground conditions. The plastic casing shall:
  - .1 Be capped at the bottom and all joints shall be solvent or heat welded to ensure water tightness.
  - .2 Be constructed of polyvinyl chloride (PVC) pipe with minimum pipe stiffness of 320 kPa (as per ASTM Standard D2412) or of material with equivalent characteristics.
  - .3 Extend above the pit floor and support channels.
  - .4 Be sealed at the top and be provided with a means of inspection to monitor the annulus between the pressurized hydraulic cylinder and the protective plastic casing, for the presence of oil.

## 2.28 Plunger and Cylinder

- .1 Provide a **new** plunger of seamless steel tubing or pipe, with a fine polished finish, securely joined with internal threaded couplings. Design sections to accommodate access into building. Provide a stop-ring to prevent the plunger from leaving the cylinder. Do not use follower guides. Completely remove the existing follower guides.
- .2 Secure the plunger to the car frame with vibration damping platens.
- .3 Construct the new cylinder of seamless steel piping sufficiently thick to withstand a test pressure equal to the maximum working pressure. Connect the cylinder with substantial external couplings. Provide a safety bulkhead, in addition to a welded closure at the bottom.
- .4 Weld the cylinder head to the cylinder, and provide an adjustable packing gland so arranged as to effectively prevent oil leakage around the plunger. Provide means to collect oil at the cylinder head and return surplus oil to the tank reservoir.
- .5 Provide a shut-off valve in the machine room designed to isolate the oil in the line and permit changing of the packing gland without draining the line. An additional shut-off valve in the pit will be acceptable.
- .6 Limit the use of 90° couplings where possible. Use 45° couplings wherever possible. Extensive use of 90° couplings will be rejected.

## 2.29 Hydraulic Oil

- .1 Provide new approved type hydraulic oil designed for elevator use, and 80 starts per hour.
- .2 Provide **biodegradable hydraulic fluid** designed for elevator use.
- .3 Provide a permanent laminated sign on the pumping unit indicating>> "Use **biodegradable hydraulic fluid** only".

## 2.30 Sound Isolation

- .1 Provide sound isolation between plunger platen and car frame.
- .2 Provide a sound isolation coupling in pipeline between pump and cylinder.

## 2.31 Buried Piping

- .1 Do not use buried piping. All piping is to be installed above ground or in a plastic tube, which prevents contact with underground soil surroundings. Provide any new piping and fittings as required to connect the new components.
- .2 Replace all threaded piping with piping that will accommodate Victaulic couplings.
- .3 Provide new rubbers in all retained Victaulic couplings.

## 2.32 Hydraulic Pipeline Identification

- .1 A marking shall be applied, to accessible piping that is located outside the elevator machine room or hoistway, stating "Elevator Hydraulic Line" in letters that are at least 19 mm (0.75 in.) high in a contrasting colour. The marking shall be visible after installation and applied at intervals not greater than 3000 mm (120").

## 2.33 Hoistway Doors

- .1 Retain and refurbish existing hoistway doors. Adjust all doors for smooth and quiet operation. Check all tracks for secure fastening to the frames.
- .2 Provide all new door guides.
- .3 Replace any worn or damaged rubber astragals.

### 2.34 Door Operator

- .1 Provide for the car gate, and hall doors, a new Peelle two-speed door operator, Door travel shall be determined by direct drive limit switch actuation, motor speed to be controlled to minimize slam or rebound, and designed to insure full opening and full closing. An automatic stay-open feature shall be provided to assure that the hoistway door panels stay fully open.
- .2 Provide average closing speed of 0.3 m/s for each hoistway door panel and 0.6 m/s for car gate.
- .3 Provide average opening speed of no greater than 0.6 m/s and no less than 0.5 m/s.
- .4 Permit opening by hand in case of power failure.
- .5 Provide new chains and all related hardware including chains for car gate counterweights.
- .6 Provide new car gate switch and wiring.
- .7 Provide new Peelle car door operator controller, in machine room.

### 2.35 Infrared Sensors

- .1 Provide infrared sensor beams (light curtains) on each side of entrance.
- .2 Device to be reliable and consistent in operation not affected by humidity or temperature changes and have inherent long term reliability with minimum maintenance.
- .3 Sensor devices shall operate as per clause 2.13.3.4.5 of the B44 Code.

### 2.36 Reduce Speed Door Closing

- .1 Should the doors be held open by the "Sensor Beam" for more than 20.0 seconds, or if there is a power loss to the "Sensor Beam" a buzzer shall sound and the door closing kinetic energy shall be reduced to 3.5 j. This time delay shall be adjustable between 0 and 60 seconds.

### 2.37 Hoistway Access Device

- .1 Provide at top and bottom landings new keyed hoistway access switches.
- .2 Locate switch in hall button fixture and engrave "Hoistway Access" with direction arrows on face plate.
- .3 Provide hoistway -door unlocking device at middle floor . Provide access by means of a releasing chain device, which is kept under a locked panel.
- .4 Remove any redundant hoistway access key switches and provide stainless steel cover plates.



### 2.38 Hoistway Door Frames

- .1 Retain and refurbish existing hoistway door frames.
- .2 Provide metal floor identification numbers on each side of the frame as per B44 Appendix E requirements.

### 2.39 Hoistway Door Tracks, Locks and Closers

- .1 Retain and completely refurbish existing door tracks.
- .2 Provide a **new** approved interlock, and motor operated retiring cam.
- .3 Connect door sections to each other with suitable roller chain running over grooved ball bearing sheaves. Connection to the upper panel to be with malleable iron connectors and to the lower panel with cold rolled square rods with adjustable connectors.

### 2.40 Car Gates and Tracks

- .1 Retain existing car gate and tracks. Replace all worn guides
- .2 Adjust car gate for smooth and quiet operation.
- .3 Provide new wiring to existing car gate rubber re-opening devices.

### 2.41 Car Platform and Sill

- .1 Retain existing car platform and sill.
- .2 **Paint the bottom angled portion of the toe guard yellow with angled black stripes.**

### 2.42 Car Frame

- .1 Retain existing steel car frame. Thoroughly examine frame for any broken welds, cracks or bends.

### 2.43 Top of Car Operating Device Equipment

- .1 Provide new top of car operating device to comply with clause 2.26.1.4.2 of B44 Code. Include an alarm bell designed to operate on normal and emergency power, duplex receptacle, and work light. Provide a guard for the inspection switch.
- .2 Provide an **additional** portable hand held operating fixture. Provide a sufficient

length of cord to ensure safe operation from all areas of the car top. Provide means to securely store the fixture on the car top when the unit is not in use. Paint the storage unit yellow in colour.

#### 2.44 Car Cab Interior

- .1 Retain the existing car cab interior as is.
- .2 Cover the existing phone cabinet box with a stainless steel cover fastened with tamper resistant fastenings.
- .3 Reuse the existing card reader in the cab. Connect up and make operative as existing.

#### 2.45 Car Operating Panel

- .1 Provide **one (1) new RECESSED operating** panel with hinged stainless steel faceplate. Locate new operating panel in location of existing panel.
- .2 Provide and locate all buttons in accordance with Appendix E, of the CSA-B44 Safety Code For Elevators.
- .3 Buttons to be of stainless steel, vandal resistant design. Provide tactile plates permanently attached by means of rivets or other approved fastenings to the left of each button; use international symbol for "Street Exit" level. All other markings to be engraved on the faceplate. Attached plates will not be accepted.

- .4 The common devices to be included are as follows:
  - .1 Floor push buttons with integral illumination using minimum 100,000 hour rated LED illuminators. Illuminate button and provide momentary audible signal when call is registered and extinguish the call when the car stops at the selected floor.
  - .2 Alarm, stop, door open, and door close buttons. Mark buttons with appropriate symbols.
  - .3 Lens for Emergency Lighting as specified elsewhere.
  - .4 Perforation holes for handsfree communication system as specified elsewhere in these specifications. Mark the button with a YELLOW international symbol for a telephone and the wording "PHONE" and "TÉLÉPHONE". Phone button to be located at 1220 mm above the floor.
- .5 The common devices to be included are as follows:
  - .1 A digital car position indicator, in the car station, using minimum 100,000 hour rated LED illuminators. Ensure bright and even illumination.
  - .2 Display letters and numbers at least 50 mm high.
  - .3 Letters and numbers to indicate the position corresponding to the landing through which the car is passing or at which it is stopped.
  - .4 Firefighter ' s Emergency Operation Panel.
  - .5 Provide key switches, appropriately marked by wording or symbols, to control the following:
    - .1 Car Lights.
    - .2 Test switch for emergency lighting
    - .3 Independent service switch.
    - .4 In-car Inspection Operation.
- .6 Engrave the following on the operating panel.
  - .1 Elevator ID Number in minimum 50 mm numerals.
  - .2 Elevator Capacity in Kilograms
  - .3 TSSA Installation Number and Logo.
- .7 Submit samples of buttons and layout drawing to Consultant for approval.
- .8 Retain and make operative the existing card reader device in the cab.
- .9 Retain and reuse existing freight loading signs in the cab.

## 2.46 Hall Buttons

- .1 Provide new stainless steel vandal resistant hall buttons similar design as car buttons incorporating minimum 100,000 hour rated LED illuminators.
- .2 Illuminate corresponding "Up" or "Down" call button when call is registered. Extinguish illumination when call has been answered.
- .3 Provide door "Open" and door "Close" buttons so connected to operate only when car is stopped level at the floor where the buttons are located.
- .4 Incorporate into the Designated Level hall button station the key switch and LED pilot light as specified under "Firefighter's Emergency Operation". Include an emergency power indicator light and appropriate engraving.
- .5 Provide in **each** hall button fixture a digital position indicator.
- .6 Provide "IN USE" lights in each hall button station.
- .7 Locate buttons in location of existing buttons. Provide stainless steel cover plates large enough to cover the existing recess around the buttons.

## 2.47 Car Position Indicator

- .1 Provide a new digital car position indicator forming part of the car operating station and located at the top of the car operating station. Indicators to display identical markings to car operating buttons, including bilingual markings for main floor.
- .2 Provide an audible signal to sound when the car stops at or passes a floor. Signal volume to be adjustable between 50 and 70 dBA.
- .3 Arrange letters and numbers appearing on the indicator to illuminate in sequence and to transfer illumination instantaneously between floor levels.

## 2.48 Signal Illumination

- .1 Illuminate all letters and all numbers with sufficient intensity to produce distinct and well defined indication under ambient lighting conditions.

## 2.49 Faceplate Fastenings

- .1 Fasten all signal fixture faceplates securely with unexposed fasteners or with tamper-proof fasteners.

## 2.50 Car Emergency Lighting

- .1 Provide new battery operated emergency lighting equipment.
- .2 Mount power pack on car top and light fixture in car station as specified elsewhere in this specification. Provide general illumination in the car with a minimum of 2 lx intensity 1220mm above the car floor and 300mm in front of the operating panel for at least a four (4) hour period.
- .3 Include means for convenient manual operation and testing of the unit in the car station service cabinet.

## 2.51 Emergency Communications System In the Car

- .1 Comply with clause 2.27.1.1.1 of the B44 Code.
- .2 Provide a hands free, vandal resistant, emergency communications device containing an internal adjustable volume control speaker and microphone, to enable two-way voice communication between the car and a location in the building that is readily accessible to authorized and emergency personnel.
- .3 The device shall be activated by pressing the **PHONE** button located at **1220mm above** the floor in the car station and shall automatically ring a telephone number of the Owners choice. Once activated in the elevator the line shall remain open until disconnected by the receiver.
- .4 Provide an LED and engraving to visually indicate that the call has been answered. Provide beside the PHONE button, an International Telephone Symbol as per E19.7.2.2.of the B44 Code and the operating instructions.
- .5 The line dialler network shall operate on any central office line along with conventional phones and shall have an internal battery for memory back-up for a minimum of two years in the event that power fails or the dialler is removed from the telephone line.
- .6 The device shall contain a ring sensor, which shall allow the initiation of a call to the elevator. The number of rings shall be adjustable. The two-way communication shall not be transmitted to an automatic answering system.
- .7 The two-way communications, once established, shall be disconnected only when authorized personnel outside the car terminate the call.
- .8 The two-way communications means shall provide on demand to authorized personnel, information that identifies the building location and elevator number and that assistance is required.
- .9 Provide all wiring necessary for the complete installation of the system from the

device in the elevator to an externally located terminal in the elevator machine room. Connect to the existing communication system.

- .10 If the emergency communication means is connected to the building power supply, it shall automatically transfer to a source of standby or emergency power as required by the applicable building code, after the normal power fails. The power source shall be capable of providing for illumination of the visual indication within the car, and the means of emergency communications for at least 4 hours; and the audible signalling device for at least 1 hour.

## 2.52 Intercom System

- .1 Provide for the elevator, an electronic desk telephone type two (2) way intercommunication system to be connected to the existing phone in the security control room and one satellite master control in the machine room. One speaker in the elevator car cab. Include all necessary controls, piping and wiring for a complete operational system.
- .2 The master station in the security room shall provide means to:
  - .1 Select the elevator cab or machine room individually.
    - .1 Select general call to the elevator
    - .2 Pulsating buzzer signal.
- .3 Provide adjustable input and output so that a master or satellite station can control its receiving and transmitting signals.
- .4 Provide the satellite station with a handset for voice communication. Provide the handset at the main console with a spring coiled retractable cord, and the handsets in the machine rooms with a 2 m long spring retractable cord.
- .5 Master station in the machine room to be restricted to the elevators within its own group and to the main console. Provide all features as described for the main console.
- .6 Provide a 98% shielded cable covered with PVC including required isolated copper inductor no 20 AWG.
- .7 The elevator Contractor is fully responsible for the supply, installation and connection of all the necessary wiring and equipment as required for a complete and operational intercommunication system. New communication device for this elevator to match the existing communication system for the recently modernized elevators # 1-2-6-9 and 12.

## 2.53 Bilingual Markings

- .1 Engrave identification and instructions at least 0.25 mm deep on operating panels and on all signal equipment in both English and French except where design is such that inference is obvious and readily understood. **NGC will approve all French text.**
- .2 All position indicators are to display Bilingual Characters similar to the Bilingual floor markings in the car operating panel.

## 2.54 Security Room Main Control Console

- .1 Console Board
  - .1 Retain the existing control panel in the security room.
  - .2 Connect up and make operational all existing features, key switches and indicators.
  - .3 The existing wiring may be retained if compatible with the new control equipment. If not, provide all new wiring and piping as required.

## **PART 3 - EXECUTION**

### **3.1 Workmanship**

- .1 Install all equipment in a first class workmanship manner. Upon completion do all necessary repairs, cleaning, and painting as required to turn the equipment over in "New Condition".

### **3.2 Redundant Equipment**

- .1 Take possession of and remove all redundant equipment from the site unless instructed otherwise by the Owner or Elevator Consultant.

### **3.3 Welding**

- .1 All welds shall be identified with the welder's identification stamp.
- .2 Field torch or grinder cutting is not permitted.

### **3.4 Pit Equipment Arrangement**

- .1 Arrange the pit equipment for convenient access and maintenance.

### **3.5 Surface Protection**

- .1 Provide protective coverings for finished surfaces.

### **3.6 Cylinder Installation**

- .1 Install cylinder plumb in exact location within protective plastic casing.
- .2 Ensure that no damage occurs to the PVC casing during installation.
- .3 Pressure test PVC to ensure there are no leaks. Consultant to witness pressure test.



### 3.7 Operating Time

- .1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed 18.5 seconds in the up direction and 19.5 seconds in the down direction.
- .2 Measure this time as follows:
  - .1 The time starts when the fully opened doors begin to close and continues until the car is stopped level with the next floor and the car and hall doors are open to three-quarters of their fully open position.
  - .2 Floor level is considered to be within 6mm of level.
- .3 The time is measured with full load in the car and in both directions of travel.
- .4 The power door operation for the hall and car doors conforms to the elevator safety code requirements.
- .5 Adjust the equipment so that for other conditions of loading, the time does not vary more than ten percent (10%).
- .6 Adjust the equipment so that the operating time, as set out above, is compatible with dependable, consistent operation without undue wear or excessive maintenance and can be readily maintained over the life of the elevator installation.
- .7 Adjust the equipment so that with the control adjusted to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride to the passengers.

### 3.8 Inspections Field Tests and Commissioning

- .1 Furnish competent personnel to assist the Consultant during the installation, inspection, and testing of the systems. Make the appropriate corrections until final acceptance of the installations.
- .2 The inspections will be carried out to ensure that the workmanship is in compliance with plans and specifications and in conformity with the proposed equipment installations that were approved by the Consultant.
- .3 Provide one weeks' notice for testing. Prior to giving notice the Contractor shall test all systems to ensure proper operation.
- .4 Perform all tests as required by the CSA-B44 Safety Code For Elevators.

### Inspections Field Tests and Commissioning - cont ' d

- .5 In addition, upon completion of the elevator upgrade, supply all personnel, instruments and devices required to perform the following:
  - .1 Test the equipment under full load and no load.
  - .2 Test the Firefighters Emergency Operation and Emergency Power Operation.
  - .3 Perform tests to certify the integrity of the cylinder casing to ensure that no damage occurred during installation.

### 3.9 Elevator Consultant

- .1 The Elevator Consultant has general supervision and direction of the elevator work. He is authorized to stop the work whenever the stoppage is necessary to insure the proper execution of the contract.
- .2 The Elevator Contractor will furnish competent men and equipment for inspecting and directing speed, load and such other acceptance tests as the Elevator Consultant may deem advisable.
- .3 The Elevator Consultant will carry out one (1) Final Inspection and one (1) Re-inspection. The cost of any additional inspections (\$500 Each) required due to the Elevator Contractors failure to correct any outstanding deficiencies previously listed, will be charged back to the Elevator Contractor by the Owner.

### 3.10 Cleaning and Painting

- .1 Upon completion thoroughly clean, remove all indications of rust and paint the following:
  - .1 Machine room and pit floor. Paint to be approved by The Owner.
  - .2 Pit equipment, channels, and buffer supports in rust resistant black paint.
  - .3 Horizontal area of the refuge space in the pit and on the car top.