DIVISION 14 - ELEVATOR DESIGN STANDARDS

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SECTION 14 – ELEVATOR DESIGN STANDARDS

1. GENERAL

1.1 General Requirements

.1 All elevator work must be performed in accordance with the requirements of the jurisdictional authorities (local, provincial, and federal) in effect at the time of execution.

.2 Stainless steel finishes shall be ASTM type 304, brushed or satin finish, X-L Blend S, or X-L Buff finish, to manufacturer's standard and Designer's stated choice.

.3 Scope of work shall include preparation, filing, stamping, and submission to the Technical Standards and Safety Authority, Elevating Devices Branch of all Design Submissions and filings for each elevating device as provided under this scope of work.

.4 Scope of work shall include for arranging and performing acceptance inspection tests for each elevating device, in accordance with the latest regulatory requirements. Conduct all tests in the presence of authorized representatives of such authorities.

1.2 References

.1 Elevating devices work shall be designed, fabricated and installed in accordance with the latest edition of the following standards and regulations:

.1 B44 Safety code for elevators and escalators, Canadian Standards Association, latest edition.

.2 Technical Standards and Safety Act, 2000, Statues of Ontario, 2000, Chapter 16.

.3 Ontario Regulation 209/01 Elevating Devices, as amended by O. Reg. 252/08.

.4 Certification and Training of Elevating Device Mechanics O. Reg. 222/01 as amended by O. Reg. 250/08.

.5 Codes and Standards Adopted by Reference O. Reg. 223/01.

.6 Occupational Health and Safety Act – R.R.O. 1990 Reg. 851 (Industrial Establishments), specifically sections 13, 14 as they relate to elevator car top guardrails and sections 24, 25, 75 and 75 as they relate to elevator machine room equipment guarding.

.7 Technical Standards and Safety Authority, Elevating Devices Branch Enforcement Procedure Bulletin 222/07, TSSA Grounding and Bonding Enforcement Procedure.

.8 Technical Standards and Safety Authority, Elevating Devices Branch Information/Interpretation Bulletin 231/08, Rooftop Access.

.9 Elevating Devices (O. Reg. 209/01).

.10 C22.1 Part 1, Canadian Electrical Code, latest edition.

.11 Ontario Electrical Safety Code, latest edition.

.12 2006 Ontario Building Code, (OBC) O. Reg. 350/06 and O. Reg. 137/07.

.13 Canadian Standards Association and Electrical Safety Authority Certification for electrical components.

1.3 Submittals, Samples, Shop Drawings and Manuals

.1 Samples to be submitted for review and approval include;

.1 Elevator cab and hall signal buttons

.2 100 x 100 (4" x 4") square sample of all polished metal materials used in finished work

.3 Sample of tactile plates used for Barrier Free access markings used for car operating panels and hall landing door frames

.2 Shop Drawings to be submitted for review and approval

.1 In addition to shop drawings and equipment details as required for formal submission to the regulating authorities, the following details and information shall be prepared and presented to U of T for review and approval as relating to the elevating devices installed:

.1 Hoistway plan view, section and elevation

.2 Elevator controller closet plan view and section

.3 Elevator guide rail bracket support locations, showing vertical distance between adjacent brackets, and location in terms of hoistway footprint.

.4 Elevator entrance assembly plan view, section and elevation

.5 Elevator cab interior showing plan view, reflected ceiling plan, front wall elevation, side wall elevation, rear wall elevation, floor plan.

.6 Elevator cabin enclosure exterior views and elevations

.7 Hoistway elevation, showing hoistway side of each entrance opening and related hardware

.8 Elevator signal and fixture drawings.

.9 Elevator remote panel(s) drawings for CACF location.

.3 Operation and Maintenance Manuals, plus TSSA Submissions and Electrical Drawings

.1 Provide one hard copy of all the following equipment information. Provide a second copy, saved on an electronic format (i.e. USB memory stick) with all drawings and documents saved in a PDF or Word format.

.1 Description of system control and operation.

.2 Details on equipment features, special operations, and life safety controls.

.3 Details of alarm signals and life safety operation.

.4 As built electrical circuit diagrams.

.5 Equipment parts catalogue.

.6 Maintenance and servicing instructions for door operators, door protective devices, cab fans, cab lighting, voice communication equipment, signals and fixture devices.

.7 Lubrication chart.

.8 Equipment parts listing, including part identification numbers for all components and devices used.

.9 Maintenance and adjusting details for new equipment provided under this Scope of work, including machines and brakes, drive motors, rope grippers, governors, controllers, door operators, door detectors, landing door interlocks, and motor drives.

.10 Equipment maintenance check chart.

.11 Equipment trouble shooting guide and instructions.

.12 As built fixture and signal drawings.

.13 As built layout drawings and equipment drawings.

.14 Instructions for cleaning, maintaining and preserving stainless steel material and surface, including warnings regarding harmful cleaning, maintenance and preserving practices.

.15 Copy of MCP and equipment log sheets. Refer to paragraph .3.5 below for additional information.

.16 Name, address, telephone numbers, and email addresses for major component manufacturers.

.17 Copy of final TSSA Design submission form, signed off and stamped by submitting engineer and TSSA.

.18 Details of equipment warranty coverage and exclusions.

.19 Manual index.

.20 All manual documents which are larger than standard size sheets shall be neatly folded and housed in large envelops or drawing pockets. These documents shall be inserted and housed in each manual binder.

.2 Software and Control System Diagnostics.

.1 System software that contains time out or automatic shut down circuitry, requiring resetting by hand held tool or remote access device, must not be provided.

.2 System software containing automatic shut down of elevator in the event detector dwell interval has been exceeded on three successive stops must not be provided.

.3 Spare copy of all system software, latest version including all updates and revisions as installed shall be handed over to U of T prior to Substantial Completion.

.4 Where diagnostic tools and operational software have a planned limited operational life, or a limited or fixed number of keystroke commands, provide the required means to reset tools, without requiring their return to the elevator installer to correct or reset.

.3 TSSA Design Submission

.1 Provide copy of signed and sealed Design Submission form as reviewed and approved by the TSSA. Copy of this submission shall be included in each copy of the equipment maintenance and operating manuals. Submit a full set of original TSSA design submissions to U of T Project Manager.

.4 Electrical Circuit Drawings and Diagrams

.1 Provide one (1) copy of all electrical circuit drawings and diagrams and mount inside the elevator machine room or controller enclosure space.

.2 Laminate this set and mount to wooden backboard in machine room or controller enclosure space.

.3 Provide additional copy of electrical circuit drawings and insert into each maintenance and operating manual.

.5 Maintenance Control Program (MCP) and Maintenance Log Sheets

.1 Provide copy of MCP as prepared and signed off by the equipment manufacturer and designer, indicating the frequency of required maintenance and the tasks required to be performed as part of long term operational maintenance, based upon ensuring optimized equipment reliability, safety and performance.

.2 MCP shall be designed in accordance with the requirements of B44-10 rule 8.5.1.3.

.3 Provide log sheets for each elevating devices, designed in accordance with the requirements of B44-10 rule 8.6.1.3.1.(f).

.4 Provide equipment call back log and record book for each elevating devices, designed in accordance with the requirements of B44-10 rule 8.6.1.4.2. and 8.6.1.4.3.

1.4 Warranty Provisions

.1 Provide a one (1) year, twelve (12) month warranty covering all equipment and products as installed and provided under this Contract. Any replacement of parts or repairs including call back service during the warranty period will be at no cost to the University.

Service response to a call back shall be provided 24/7/365 days as follows:

A. Entrapment – within 1 hour

B. Single elevator in a building – within 1 hour

C. Disruption in a building with multiple elevators – within 4 hours

The warranty date shall commence on the date of Substantial Completion for the Work.

.2 Upon receiving notice of a defect or deficiency, the Contractor shall immediately correct, within an agreed upon time, at its expense, all work found deficient or defective or being incapacity of or unable to meet the design requirements, performance expectations or other specific operating criteria as established within the Contract Documents.

.3 In the event that the same component, device or piece of equipment is found to fail or prove unreliable in two instances within the Warranty period, and the failure of said device cannot be attributed to faulty maintenance, misuse or unintended use, the elevator installer shall replace all such device components.

.4 Should the Contractor delay or fail to make good items of Work as confirmed by U of T as being deficient during the warranty period, and after being given reasonable time to correct such deficiencies, U of T may arrange to have such defective or deficient work complete by another quality company or by using its own in house resources, and then back charge to the Contractor for all costs incurred to rectify deficient work.

1.5 Maintenance Provisions

.1 Maintenance provisions and requirements for the elevating devices shall be covered under a full services maintenance agreement augmented with the following special requirements as set out herein, and including all the requirements, coverage and provisions as set out in U of T's Standard Maintenance Contract Section 14 90 00.

.2 "Full service" coverage shall include the following requirements and provisions.

.5 Maintenance shall include for regular service visits, at intervals of not more than

.1 Once every 16 days (twice per month inspections) for overhead gearless traction elevators,

.2 Once every 32 days (once per month inspections) for machineroomless gearless traction elevators,

.3 Once every 32 days (twice per month inspections) for electric traction overhead, basement or offset geared traction elevators,

.4 Once every 32 days (once per month inspections) for hydraulic passenger, service elevators or dumbwaiters).

.6 For call backs occurring outside of normal working times, emergency call backs excepted, U of T will pay the overtime premium portion for labour, except for emergency call backs required for the release of trapped passengers, or in the event that all elevators within any one group are out of operation.

.7 Maintenance coverage shall also include for the following:

.7 Replenishment of machine bearing oil (where provided), sealing of bearings and pour spouts to ensure no oil spills over machine base or floor. In the case of geared machines, worm gear case lubricant shall be changed at least once every two years.

.8 Operation and control circuits shall be checked for proper operation. Specification performance settings shall be maintained, except when requested in writing by U of T to change such performances.

.9 Replacement of all hoist ropes, governor ropes, as well as travelling cables and other hoistway conductors.

.12 Adjustment of car operating performances, load weighing settings, door performances, leveling and all other system adjustments shall be periodically checked and readjusted to ma*intain specified performances.*

.8 In the event the maintenance contractor fails to correct noted deficiencies within the stipulated correction time as listed by the TSSA in their periodic inspection report, or, in the event the maintenance contractor fails to submit voluntary compliant documents, or falsely indicates information or details on the voluntary compliance requires, the elevator maintenance contractor shall be responsible for all additional levies, fees and fines as imposed by the TSSA to the U of T.

1.6 Appendix E Compliance

.1 This elevator shall be designed in full compliance with B44 Appendix Section E, including the provision of audio voice annunciation.

.2 Refer also to U of T Design Standards Barrier Free Accessibility, Section 11 Elevators. All items as listed therein shall be incorporated into the final design of the elevators as provided for each Project.

.3 Provide voice annunciation to announce floor number and car intended direction of travel, as well as basic warning messages (i.e. “please clear doors”), to accommodate Barrier Free Access designs. Unit shall announce messages through a speaker grille mounted in the car operating station that does not contain the hands free telephone unit. Annunciation messages shall be given in English, having a noise output strength of at least 10 dBA above ambient, with a maximum output noise level of 80 dBA. Noise output strengths shall be measured at car operating panel’s annunciator

speaker grille.

.4 At the side opposite each landing entrance, provide a reflective surface, suitably located to permit a person in a wheelchair to see behind themselves when backing out of the elevator.

1.7 Union Work

.1 Elevator work shall be undertaken by International Union of Elevator Constructors, Local 50.

1.8 Patents

.1 The Contractor shall be responsible to save and hold harmless U of T for all liability resulting from copyright and/or patent infringement that might arise because of the finished Work as provided.

1.9 Quality Assurance

.1 Under no circumstances will the Contractor provide control and operating systems that requires special time sensitive or command limited service access tools, special or restricted access diagnostic hardware, or involve limited access hardware or software, or otherwise limit or restrict the maintenance options of the Building.

.2 Provide to U of T, all manuals, hardware, software, operating manuals, maintenance instructions and service equipment as required to maintain the elevator control and operating systems in peak condition.

.3 *Use of prototype equipment or controller equipment designs having less than three years of proven experience within commercial and institutional buildings will not be allowed***.**

.4 All elevator work shall be performed by properly trained and skilled EDMA certified and licensed mechanics. These persons shall be direct employees of the elevator installer.

.5 Elevator circuitry that contains automatic shut down commands, or requiring periodic timer or counter resets to ensure continued operation shall not be permitted.

.6 Prior to award of contract, the Contractor will be required to furnish written affidavit that systems provided under this scope of Work contain no such time out, lock out or automatic shut down provisions.

2. PRODUCTS - Description of Equipment

ELEVATOR DESIGN REQUIREMENTS SHALL BE SPECIFIC TO THE FACILITY BEING PLANNED. ELEVATOR PERFORMANCE AND DESIGN SPECIFICS SHALL BE CONFIRMED BY A SPECIALIZED ELEVATOR CONSULTING FIRM, WITH COPIES OF ALL REPORTS, TRAFFIC CALCULATIONS AND DESIGNS USED TO BE FORWARDED TO U OF T FOR THEIR REFERENCE, COMMENT AND RECORD.

2.1 Basic Description of Elevator Equipment

.1 Number – to be confirmed with project specifics

.2 Designations – to be confirmed by project

.3 Number of Entrances – to be determined (tbd)

.4 Entrance Locations – tbd

.5 Vertical Rise: tbd

.6 Machine Room Location – tbd

.7 Type –tbd

.8 Capacity – tbd, except that minimum cab capacity and cabin size shall be 1,590 kg (3,500 lb) / 21 persons, Class A loading. With a clear inside cabin width of 2,030 mm and clear depth of 1,650 mm measured from face of front return wall to the finished face of the rear wall. Passenger elevators shall be designed to accommodate Class A, General Passenger loading, except where required to function as part time service elevator. Full and part time service elevators shall be designed to accommodate Class C3 Concentrated Loading, where the heaviest single piece to be carried is to be 250 kg less than maximum car capacity.

.9 Rated Speed – tbd

.10 Control – AC VVVF for traction, AC Single speed with soft start for hydraulic applications. **[GREEN or LEED standard provision]**

.11 Operation –Full Selective Collective

.12 Operating Features

- .1 Independent Service
- .2 Card Reader Security Provisions, including floor tracking
- .3 Fire fighters' Emergency Operation, Phase 1 and 2
- .4 Load weighing dispatch and bypass where multiple cars are provided
- .5 Cabling for CCTV camera

.13 Entrance Type – Horizontal Slide, Centre Opening (to be used in heavier trafficked applications) or Horizontal Slide, Single Section (to be used in other passenger trafficked applications). For service elevators doors shall be Horizontal Slide, Two Speed.

.14 Entrance Size – tbd, but minimum clear opening width shall be 1,070 mm.

.15 Entrance Frames – tbd

.16 Door Operator – GAL MOVFR or equivalent

.17 Provide car and counterweight roller guides as opposed to lubricated slippers. Provide equalizing springs to facilitate tension adjustments. **[GREEN or LEED standard provision]**

.18 Door Protection – Multi beam infra red detector – use of 3D sensor feature will not be accepted. Automatic shut down of elevator following three successive nudging applications will not be accepted. Use Adams Gatekeeper or Janus PanaForty type detectors.

.19 Signals and Fixtures

.1 Where Hall lanterns are used, they shall be designed to allow for 180 degree viewing of car direction indicator. Lanterns to have dual stroke tone with adjustable volume control at each fixture.

.2 Digital floor indicators shall be provided at primary lobby landing (mandatory), and at all other landings (desired). Indicators shall display car position in digital display having character heights of no less than 50 mm. Beside floor display numbers, provide arrow to show respective direction of car travel.

.3 Battery power cab lighting, with one flush-mounted fixture set within each car operating panel. Provide test facility within car service cabinet.

.4 Two speed cab ventilation fan, with fan remotely located on car crosshead.

.5 Number of car operating panels (tbd)

.6 One position indicator per panel located at top of panel.

.7 Hands free two way voice communication speaker/microphone mounted behind perforations in the main car operating station.

.8 Flush mounted service cabinet within one car operating panel.

.9 Card reader device mounted in one panel, reader not by Division 14.

.10 Car call buttons to be US 91 BB Series, complete with dual light illumination. Hall call buttons to illuminate green to indicate UP calls and red for DOWN. All car and hall call button illuminations to be LED type.

.20 Associated Dimensions

.1 Hoistway Dimensions: tbd.

.2 Overhead – tbd.

.3 Pit Depth – tbd.

.4 Machine room size – tbd.

.5 Machine room location – tbd.

.6 Cab Dimensions: tbd.

.21 .Elevator Cab Interior Finishes

.1 To be determined by Project designer. However, the following minimums must be provided:

.2 Textured stainless steel cladding of inside face of car door panels and front return walls (pattern 5WL or equivalent).

.3 Minimum 2,440 mm (8 feet) clear inside cabin height beneath suspended ceiling.

.4 Polished metal handrails running along the full length of each cab non access wall. Return ends of handrails back in to face the adjacent cab wall so as to eliminate possible snag hazard. Where possible use flat bar handrails as opposed to tubular design. Where flat bar handrails are provided, they shall be of solid metal construction, without wood or composite core.

.5 Finished cab floor shall be installed so it is flush with the top of the car landing sills. No protections or recesses permitted.

.6 Cab lighting and fan shall be designed to automatically turn off during periods of inactivity. Arrange circuits to automatically energize once a call demand has been actuated. **[GREEN or LEED standard provision]**

.7 Joints between the edge of the finished floor and the cab wall sections shall be sealed with water proof sealant to prevent water from getting to the plywood subfloor below.

.8 Provide each cab with stainless steel button pad hooks, designed to accommodate the hanging of protective mats inside the car. Hooks shall be mounted off the front, rear and both side walls.

.9 Provide one set of cab protective wall mats, for each side wall, rear wall, both front return walls and car transom. Front return panel sections shall have cut out for car panels.

2.2 Card Reader Security Provisions

.1 All elevators to be equipped with card reader access restrictions. Design elevator controls to accommodate these provisions.

.2 Provision of card reader devices and security controller is not the responsibility of the elevator section. However, the elevator installer shall be responsible to hook up and connect card reader devices to be mounted behind the car operating panels.

.3 Include provision for card reader device to be mounted within one car operating panel within each car. Provide in the faceplate of the car panel a lexan lens, coordinate size with security trade, behind which the proximity reader device will be mounted.

.4 Shielded wiring required for card readers shall be run between elevator machine room and car operating panel without breaks, splices, patches or joined connections.

.5 Design elevator controller with necessary circuits to allow for security card reader operation as follows:

.1 Security system master controller as provided by security trade will control activation of security operation.

.2 Under security mode of operation, elevator shall respond to registered hall landing calls plus Main Lobby landing car calls without restrictions.

.3 All remaining car calls, excluding Main Lobby landing, shall only be capable of registration only when a call demand is placed in combination with the presentation of an authorised security access card.

.4 Registered car calls, once cleared by the security master controller, shall be made self-holding until the car stops at that landing.

.5 Provide all circuits and controls to make car calls self-holding after car call clearance has been issued from security master controller and car call has been registered.

.6 Activation of Fire Emergency Operation shall automatically over ride all security system access restrictions.

.6 Provide a dry contact for each car call (including Main Lobby landing).

.7 Provide controls with adjustable time delay, initially set between 2 and 3 seconds, to allow a person to register their landing call demand after having their access card approved for car call registration.

.8 All car call circuits shall be isolated to prevent electrical feedback through interconnections with security card reader controls.

.9 Provide a two position keyed switch, mounted on the exterior of each car controller. Label key switch "SECURITY SYSTEM OVER RIDE". When key is turned to OFF position, complete security control, as determined by the security master controller shall remain in effect. When the switch is turned to its ON position, all security signals, instructions and interfaces with the security system shall be interrupted. Under this mode, the elevator will operate completely independent of the security master controller, with no access restrictions of any kind.

.10 For a multiple car group of elevators, provide in the elevator machine room a master group control two position key switch labelled "SECURITY SYSTEM OVER RIDE". When this key switch is turned to its OFF position, complete security control, as determined by the security master controller shall remain in effect. When this key switch is turned to its ON position, all security signals, instructions and interfaces with the security system shall be interrupted to all elevators operating within that group. Under this mode, all elevators within the group will operate completely independent of the security master controller, having no access restrictions of any kind.

.11 Provision of card reader security system, including master controller, card reader device, relay interface controller, power supplies for the card reader, security system controllers and other related devices shall not be the responsibility of the elevator section.

.12 Elevator section shall provide all required signal interconnections and wiring interfaces for card reader security equipment as well as the installation and interconnection of card reader devices within the new car operating panels.

2.3 CCTV Security Provisions

.1 Provide each elevator with one coaxial cable (Beldon Type RG6), plus four-shielded cables, #20 AWG for U of T's exclusive use for closed circuit television monitoring equipment.

.2 Terminate cables in elevator machine room within a junction box or terminal strip mounted in the controller, clearly designating these cables as for CCTV use.

.3 Provide metal electrical junction box, sized no less than 300 mm square, mounted at the left or right rear corner of each elevator car top. Provide terminal strip in box and bring to terminal strip two pair #14 AWG conductors, clearly marked and feed from a 120 volt AC power supply. Mark outside cover of box with "CCTV". Terminal traveling cable coaxial and shielded conductors set aside for CCTV use in this junction box. Leave a coiled loop of no less than 2 metres of cabling to allow for the interconnection with the in car CCTV camera. Provision of camera is not the responsibility of the elevator section.

.4 Shielded and coaxial wiring shall be run between elevator machine room and car operating panel without breaks, splices, patches or joined connections.

2.4 Life Safety Provisions - Voice Communication

.1 Provide hands free telephone with re-programmable auto dialler, set up to allow 10-digit dialling. Unit shall be Webb Electronics Inc. model OEM-150.

.2 Telephone unit shall be capable of making outgoing calls and receiving incoming calls. Incoming calls shall not require in-car activation of telephone unit in order to initiate communication.

.3 Provide mechanically activated push button to activate telephone. Push button shall be distinct from car operating and floor call buttons and shall be identified with engraved signage reading "PHONE", along with operating instructions. Operating instructions shall be engraved on top car operating panel, adjacent to hands free phone unit.

.4 Telephone unit shall be contained within Car Operating Panel. Speaker grille and microphone shall be located behind perforated grille made in the surface of the car operating panel. A separate faceplate for the telephone unit will not be permitted. Provide illuminating LED indicator designed to show when two way voice communication has been established.

.5 Telephone shall initially be programmed to ring through to U of T's security police desk/reception. Number to be confirmed prior to hand over of first modernised elevator.

.6 No visible fastenings, mounting devices or components, other than speaker/microphone grille and activation button shall be visible from inside the elevator cab when the car station panel is in its closed position.

.7 In car phone unit shall be capable of receiving incoming calls from an outside line and the Main Lobby Rescue Station handset.

.8 Provide a Main Lobby Rescue Station to be located at either building EVAC panel or CACF room location, or as directed by Project Manager. This Station shall be provided with a handset capable of communicating with each elevator within the complex. Rescue Station shall be provided with engraved signage providing instructions on the use and operation of its handset controls.

.9 Bell phone line and 120 VAC power supply will be brought to the Rescue Station location by trades other than the elevator section.

.10 Main Lobby Rescue Station units shall be similar to Webb Electronics Model LS-250 Lobby Station, with phone cabinet housing and phone handset access door to be finished in stainless steel.

.11 Provision of signal wiring running from Rescue Station to each elevator cab shall be the responsible of the elevator section, with remote sections of wiring running outside the hoistway installed by the electrical section, through interconnecting conduit provided by the electrical section.

2.5 Life Safety Provisions – Fire Emergency Operation

.1 Provide elevators with automatic Fire Emergency Operation (FEO) in accordance with the latest edition of the Elevator Safety Code Clause 2.27.

.2 Designation of a red hat fire fighters car to be provided where required by Ontario Building Code.

.3 At Primary recall level provide 75 mm high car designation numbers for each elevator.

.4 Primary recall level shall be designated as the main landing into which first responders arrive into the Building (normally the Ground floor lobby).

.5 Alternate recall level shall be the first fire separated landing located above the primary recall lobby.

.6 Provide controls and wiring interfaces to accept and recognize two different recall signals.

.1 Primary recall – initiated automatically by fire alarm system or manual recall initiated by key switch located in the primary recall lobby elevator hall call station. Once activated, this recall mode shall cause elevators to return to the primary recall lobby.

.2 Alternative level recall – initiated automatically by smoke detector device located within the primary recall landing's elevator lobby. Once activated, this recall mode shall cause elevators to return to the defined alternative lobby.

.3 Elevator Machine Room/Hoistway/Pit space – signal circuits to elevator controls when activated in car fire service annunciate light shall flash to indicate activation of elevator space fire alarm sensor. IN the event the machine room is located at the primary recall landing, or, in the event the elevator pit is located immediately below the primary recall lobby, then

activation of either of these sensors must cause car to recall to its alternative landing.

.7 At CACF panel or at Annunciator panel location, provide second or remote Phase 1 recall key switch. Interconnecting wiring between this remote panel and each elevator hoistway to be supplied by Division 14 trade, while installation if outside the hoistway to be done by Division 16 through interconnecting conduit as provided by Division 16. Division 14 trade shall terminate wiring interconnections at remote panel location.

.8 Provide each elevator cab with one fire service cabinet, containing all controls, signals, engraving and signage in accordance with requirements as set out in B44-047 Clause 2.27.3.3.7 and Figure 2.27.3.3.7.

.9 Provide engraved signage as required by B44 Code for all Phase 1 key switches as well as all in car (Phase 2) switches. Engraving shall be set into fixture faceplate (both primary level lobby hall station and remote panel) and on inside face of fire service control cabinet door (Phase 2 signage). Do not use applied plaques or plates containing such signage.

.10 Provide key switch lock box to house spare FEO-K1 keys, and mount in CACF room or in alternative location as defined by Project Manager.

2.6 Life Safety Provisions - Emergency Power Operation

.1 Elevators shall be provided with emergency power operation.

.2 Where three phase standby power is available, connect to elevators. Elevator controls to be provided with automatic sequencing controls designed to restrict the operation of cars under standby power so that only one elevator per group (or other defined combination as determined during design review) will run under standby power at any one time. Provide re-selection key switch controls, and mount in hall landing call station button fixture as located at primary recall lobby landing.

.3 In the event three phase emergency power is not available, elevators to be provided with stand alone UPS provisions, designed to allow the car to drift (in the case of traction elevators) or lower (for hydraulic units) to a landing. Upon arrival at this landing, car doors shall automatically open, allowing trapped passengers to vacate the cabin enclosure.

.4 Where three phase emergency power is available provide emergency power warning light in primary level recall landing lobby call station and also at the remote elevator panel (CACF room or EVAC panel location). Light to illuminate whenever power is from the Building's standby system.

2.7 Traction Equipment

.1 In high traffic locations, provide equipment designed to accommodate a minimum of 240 motor starts per hour. Do not use components or equipment designs that are rated only for 180 motor starts per hour.

.2 In location where moderate to light traffic is expected use, where ever possible machineroomless electric traction drives as opposed to electric hydraulic.

.3 All electric traction units to be provided with variable voltage, variable frequency drives, complete with re-generative power provisions on installations being installed within new facilities. **[GREEN or LEED standard provision]**

.4 Provide tuned choke coils to effectively isolate objectionable and disruptive harmonics from entering the Building's power supply. Provide a drive isolation transformer to reduce power line notching and distortion. Provide harmonic filters to limit harmonic contribution to under 3% and harmonic distortion to less than 5%.

.5 Equip drive with protection against loss of tachometer signal, tachometer error signal, over speed, over current, overheat, low voltage, loss of feedback circuit and failure of brake lift. Control shall be provided with an automatic monitoring circuit that will cause an elevator to shut down in the event its rated speed under inspection or car top operation exceeds 0.76 mps (150 fpm).

.6 Drive control cabinets and mountings shall be isolated to prevent vibrations from disrupting elevator car control circuits, as well as protection against noise transmission into the Building's structure.

.7 Provide drive controller with means of dissipating heat build up, without affecting other elevator equipment. Where control cabinets are provided with grilles, vents, or forced ventilation, ventilation openings shall be provided with filters.

.8 Provide solid state microprocessor based, high performance digital drive control and programmable distributed logic EEPROM circuitry. System shall be capable of providing a speed regulation performance of ±1% or better. Controls shall use digital circuitry to allow for field adjusting of individual performance parameters such as acceleration rate, deceleration rate, and jerk rate. Performance settings shall be stored on EEPROMs in non-volatile memory.

.9 Provide pre-torquing of drive motor to eliminate "roll back."

.10 Provide equipment that can tolerate a voltage fluctuation of +/- 10% without resulting in car shut down or erratic performance.

.11 Provide equipment that can tolerate a current fluctuation of +/- 5% without resulting in car shut down or erratic performance.

2.8 Hydraulic Equipment

.1 Provide power units rated to accommodate a minimum of 90 motor starts per hour.

.2 Provide submersible power units, with drive motor and pump located within the same enclosure that serves as the oil reservoir.

.3 Do not install valve unit over oil reservoir within protective mesh or screen to capture components that might fall out from the value during servicing,

.4 Provide hydraulic valves as manufactured by Maxton or EECO. Do not provide valve designs from other manufacturers.

.5 Oil lines shall be provided with pipe stands, and each pipe stand shall be isolated from building structure. Oil pipe shall be isolated from pipe stands.

.6 Provide gate valve adjacent to oil tank in the machine room and provide another gate valve in the elevator pit, adjacent to cylinder.

.7 Provide oil line with isolation fittings, strainer, and muffler.

.8 Use twin post, holeless hydraulic jacks, with single stage piston wherever possible. Use of in ground hydraulic jacks are to be avoided. **[GREEN or LEED standard provision]**

.9 Do not use jack design requiring the use of piston stabilizers.

.10 Jacks to be installed plumb and aligned with car guide rail columns.

.11 At the top of each hoistway, provide permanently installed steel I beam designed to accommodate the safe hoisting requirements as defined by the elevator installer. Provision of this beam is not the responsibility of the elevator installer.

2.9 Equipment Guarding

.1 Provide in accessible elevator machine room spaces with equipment protective guarding to protect against accidental contact of all rotating and moving components as well exposure to high voltage electrical studs, terminals or lugs. Guarding shall be designed and provided to satisfy the requirements of O. Reg. 851 sections 24, 25, 75 and 76.

.2 Provide at the top of each elevator cab, protective railings and toe boards, designed in accordance with the requirements of O. Reg. 851 sections 13 and 14, as well as TSS Director's Safety Order 245/10, running along the full length of exposed sides having more than 300 mm horizontal clearance between the edge of the car top and adjacent hoistway construction.

.3 Provide protective pads to protect against chaffing and impact damage of elevator travelling cables. Install this protection on all surfaces throughout the hoistway including divider beams, brackets, pit access ladders and other construction that may come in contact with traveling cables during the motion or movement of the elevator cab.

.4 Within elevator machine room spaces, provide guarding of holes in floor slabs provided to permit the passage of hoist ropes, governor ropes or car positioning tape.

2.10 Car Controllers

.1 Provide car controllers designed and equipped with programmable logic microprocessor controls and self-diagnosing features.

Acceptable Controllers:

Motion Control Engineering MCE – ibox (preferred)

Galaxy – GAL

.2 Control and operating circuits shall use EEPROM chips to allow for onsite

modifications and changes without requiring new chips, off site programming or hard wiring of circuits.

.3 Only generic car controller designs shall be provided. Do not provide or use proprietary controller designs, or controller designs where access to spare parts or engineering assets is limited or restricted.

.4 Design controllers to include all features as noted herein.

.1 Controller cabinets shall be floor or wall mounted. They shall have self-supporting steel structures, and be provided with hinged access doors. Cabinets shall be ventilated, with ventilation slots and openings provided with air filters where forced ventilation is used.

.2 Equip high voltage terminals and lugs with protective means to guard against accidental contact and exposure.

.3 Floor mounted controllers or controller mounting stands shall be secured to the floor.

.4 Controller cabinet doors shall be provided with ground strap.

.5 Mount high voltage devices and resistors away from printed circuit boards and other low voltage solid-state devices.

.6 Provide electrical noise suppression devices in all input and outputs for solid-state circuits as well as all power supplies.

.7 Where enclosed or encapsulated relays are used, provide an LED indicator status light to illuminate when the relay is energized.

.8 Provide each controller with means to show car position. Means may consist of CRT screen, LED indicator or digital fluorescent display

.9 Solid-state cards shall be equipped with edge connectors to allow for quick removal and replacement. Card slots shall include mechanical keyways and locks to ensure proper and secure seating of all printed circuit cards.

.10 Where multiple connectors terminate at printed circuit cards, provide wiring harnesses.

.11 All circuits containing volatile memory shall be provided with battery backup.

.12 Controllers shall be provided with interface provisions to accommodate card reader access security.

2.11 Elevator System Control Features

1. Provide new microprocessor based selective collective automatic operation to fully coordinate and control elevator car movement and dispatching.

2. Group control system shall use synchronous data link control protocol or local network to ensure error free communications between system control modules and elements.

3. Group dispatching systems shall include specific control programs for UP and DOWN peak operations, as well as for periods of light/intermittent traffic and balanced and heavy two way traffic.

4. Control programmes shall automatic select appropriate group response, based upon real time passenger activities ad car loadings. In addition, provide time clocks for automatic initiation of UP and DOWN peak control programmes.

5. Provide elevators with the following control features and options:

    1. Dispatching controller shall select the elevator best able to respond to a hall landing call, based upon real time operating data. Car selection shall be based upon car location, direction or travel, door status, car load, car call already registered for that landing, number of registered car calls, previous hall call assignments. Preference shall always be given to an elevator already at that landing, or an elevator with a registered car call for that same landing, or the closest available elevator that is running in group operation.

    2. Assign registered hall calls to the other group elevators when a landing call occurs "behind" an elevator.

    3. If an elevator fails to depart from a floor, within an adjustable period of time that is initially set at 25 seconds, automatically disconnect that elevator from group service, and all hall landing calls to be re-registered at that landing. Subsequent hall calls shall not be responded to by the elevator sitting at that floor, unless the problem that has caused the car to time out has been resolved.

    4. Assign one elevator to sit at the primary landing, during periods of inactivity. Only the designated “next up” car shall park at this Lobby. At all landings, parked cars shall only open their doors in response to a registered hall landing call.

    5. Whenever a car without registered car calls arrives at a floor where both up and down hall calls are registered, the car shall initially respond to the hall call for the direction in which it has been travelling. If there is no hall call registered for the direction in which the car has been travelling, the car shall close its doors and immediately reopen them in response to the hall call in the opposite direction. In car directional indicators shall always indicate the direction change when the doors reopen.

    6. A car arriving at a floor to park shall not open its doors, nor illuminate or annunciate its directional indicator.

    7. Cars shall always activate directional indicators whenever stopping at a landing in answer to either a hall landing or car call, unless the elevator is being operated under independent service, inspection operation, or has been designated to park.

    8. Provide independent service feature to allow car to be removed from normal service and respond to car calls only. Once activated, automatic door closing and door dwell times shall be cut out, hall lanterns shall not operate and

registered car calls shall be cleared. Once activated, momentary pressure of car call button shall register call demand. Door closure shall be controlled by constant pressure on either car call button or DOOR CLOSE button. Upon arrival at that landing, car doors shall automatically open and remain open until doors are closed in manner as described above or car is returned to normal operation. Activation of Independent Service shall be controlled by two position keyed switch mounted in car operating panel.

9. Upon arrival at terminal landing, registered car calls shall extinguish. Alternatively, prevent car calls for landings "behind" current car location, from being registered.

10. Provide each car with the following load weighing provisions:

    .1 Initiate whenever the car load reaches a pre-determined fixed percentage of its rated capacity.

    .2 Once activated, load weighting shall cause the car to bypass hall calls until such time as its load is reduced to less that the threshold for this operation.

    .3 Response to car calls shall not be affected.

    .4 Loading weighing shall be provided for dispatch (set at 50% of rated car load) and hall call bypass (set at 40% of rated car load).

    .5 Each load weighing operation shall be independently adjustable, between 0 and 100% of rated car load.

    .6 Load weighing devices may be under car platform sensors or strain gauges, crosshead strain gauges or load cells, or rope hitch transducers.

11. Provide anti-nuisance operation, designed to clear or cancel registered car calls, if a disproportionate number of calls are registered that exceed the car's measured load. Anti nuisance feature may be activated by photo eyes or load weighing.

12. Provide light and fan control circuit to extinguish power to cab lighting and fan during periods of elevator inactivity. Activation time shall be field adjustable. Once actuated, cab lights and fan shall turn off, but shall immediately reactive upon car being assigned new landing call demand. During period when lights are cut out, car call buttons, alarm bell, phone, and door open buttons shall remain operative and fully functional. **[GREEN or LEED standard provision]**

13. Provide nudging operation that will cause a buzzer mounted on top of the elevator cab to sound in the event the door protective device is activated for more than 20 seconds.

    .1 Buzzer shall continue to sound throughout the entire closing process.

    .2 Doors shall close at a reduced speed, calculated upon actual car door mass.

.3 Nudging feature shall be rendered inoperative when the elevator is operating under independent service.

.4 Control circuitry that automatically causes the elevator to shut down, requiring manual reset, following three successive nudging activations, shall not be permitted.

14. Do not provide door pre-open feature.

6. Elevator group supervisory system shall be a software based, programmable logic micro computer. The computer system shall monitor system demands, coordinate car assignments and dispatch elevators so as to provide the most efficient service to both the riding and waiting passengers. Only one elevator at a time shall be selected to respond to a hall landing demand, and priority shall be given to an elevator that is already travelling in the direction of that call, or an elevator that already has a registered car call for that landing, or a running car. Do not assign further cars to a hall landing call unless it is determined a more efficient response can be achieved, or in the event the designated response elevator fails to or otherwise cannot complete its assignment.

7. Control parameters shall be capable of site adjustments using diagnostic tools and EEPROMs.

8. Group controller shall include fixed dispatching routines for UP PEAK, DOWN PEAK and LIGHT TRAFFIC.

1. UP PEAK operation shall be activated by time clock and by an adjustable number of consecutive cars which are departing from the lobby with car loadings in excess of 50% rated capacity. UP PEAK shall be retained for an adjustable periods after traffic demands ease. During UP PEAK operation, empty or free elevators shall return nonstop to the Lobby landing lobby. No elevator shall be assigned to park at an upper lobby level as long as UP PEAK operation is in effect. During UP PEAK operation, only one elevator at a time shall be permitted to park with its doors open and "next up" lantern lit. Response to DOWN landing calls shall not be ignored during UP PEAK. DOWN calls shall be responded to in the most efficient manner, as determined by the group controller, though priority shall be given to UP calls.

2. DOWN PEAK operations shall be activated by time clock and by an adjustable number of consecutive elevators alighting passengers at Lobby, where the number of passengers exiting are equal to or more than 50% rated car carrying capacity. DOWN PEAK operation shall be maintained as long as traffic conditions warrant, or as long as the time clock is set for. During DOWN PEAK, no unassigned elevator or empty car shall be permitted to park at the Lobby landing. During this operation, elevators shall be dispatched to the highest registered hall landing call, or to a long wait call.

3. Under LIGHT TRAFFIC, one elevator shall be dispatched to park at Lobby. The remaining elevators shall either park at their last landing or car call assignment, or be dispatched in advance of an anticipated hall demand at

some above Lobby landing. Equip controller with the ability to programme designated parking floors at which one elevator is to be parked at during LIGHT TRAFFIC.

9. Provide dispatch failure protection that will automatically force elevators to continue to stop for hall landings, whenever the normal means of dispatching has failed.

10. All time clock devices, as used to initiate and control UP and DOWN PEAK operations shall be independently adjustable. Use only solid state clocks, with 7 day, 24 hour timer. One timer may be used to control both UP and DOWN PEAK functions. Timers shall be equipped with means to bypass weekends. Provide clock timers with battery back up and ready means of adjusting time and control settings as well as incorporating automatic updates and changes arising from switch over from Eastern Standard Time to Eastern Daylight Savings Time and back again.

11. Equip group operating controls with means to learn actual Building traffic patterns are react pro-actively in response to clear and defined trends. Such "artificial intelligence" or "fuzzy logic" systems shall be based upon latest program version, and shall be designed to suit the specific size and nature of the elevator group parameters.

12. Independent software-based, programmable microprocessors or microcomputers shall be used to control elevator group and individual car operations. Systems shall monitor traffic demands, coordinate car assignment and dispatch elevators to minimize passenger-waiting times.

13. Provide remote control monitoring provisions where multiple cars are provided. See Article 2.12 below for additional details.

2.12 Central Monitoring Provisions

1. The requirements of this article apply to where multiple elevators are being provided within the same building. The requirements of this article do not apply to an installation where a single lift or elevating device is to be provided.

2. Provide central monitoring system (CMS) information elevator management monitoring system to allow for interactive, real time remote monitoring and control, as well as archival and operating data retrieval. This system shall allow for remote monitoring and control of all elevators. Central monitoring equipment shall be able to control and display operating information for all elevator groups on the same computer screen.

3. Provide one monitor for information display and mount in the Building, within an office or secure location as confirmed by U of T.

4. Cabling required to interconnect all devices and controls for the CMS is the responsibility of the elevator installer. Electrical section shall install wiring between hoistways and remote location of the CMS station, with wiring running through conduit provided under the electrical trade's scope of work.

5. Provide monitoring unit, the following computer hardware and associated equipment:

1. 533 mm flat screen colour monitor
2. IBM compatible CPU with dual core Pentium processors complete with 1G RAM and 500+ G byte hard drive
3. Provide CPU with:
   - .1 One serial port
   - .2 One parallel port
   - .3 Three USB ports
   - .4 Writeable CD/DVD ROM drive
   - .5 Graphics card to support flat screen monitor
   - .6 Colour laser printer, complete with parallel cable connections and compatible with Microsoft Windows[7] or XP Professional operating software.
   - .7 Three button wireless mouse
   - .8 Wireless keyboard
   - .9 V90 Modem
4. CMS shall be designed and accommodate Microsoft Windows operating system and shall allow qualified users to monitor and assess real time elevator performance information and data in various formats and screen presentations, including graphic and data tabulation formats.
5. CMS shall run Microsoft Windows[7] or XP Professional software. User interface shall be as per other Windows[7] based programmes. When connected on-line, the CMS shall display simulated hoistway and car configurations, with real time elevator operating information such as car position, door conditions, direction of travel, registered car calls, registered up and down landing calls, elevator status, elevator alarm condition, group operation setting (i.e. UP peak, DOWN peak, TWO WAY peak, intermittent), time of day, date, and emergency operation conditions.
6. CMS shall be capable of displaying a variety of system output screens; each fully formatted showing specific details for each elevator, as well as the group status, plus emergency conditions such as fire, emergency power, voice communication and security operations.
7. Screen displays shall be controlled by keyboard entries, as well as password or other security access provisions.
8. System shall enable the display of the following parameters from the remote terminal location:
   - .1 Parking floors
   - .2 Hall call propriety times
   - .3 Car call registrations

.4 Group operating modes

.5 Nudging operation

.6 Car out of service

.7 Door opening

.8 Door closing

.9 Car on independent service

.10 Car off independent service

.11 Car to lobby return

.12 Car out of service

.13 Lobby lock out - per floor

.14 Lock out – per car

.15 Lobby unlock - per floor

4. CMS shall also be capable of providing archival data records for group and individual elevators. Report information shall include:

.1 Average waiting time for up direction landing calls

.2 Average waiting time for down direction landing calls

.3 Average waiting time for all landing calls

.4 Number of registered up direction landing calls

.5 Number of registered down direction landing calls

.6 Number of registered landing calls for both directions of travel

.7 Elevator faults and diagnostic records, per car

.8 Diagnostic records and fault logs for the group

.9 Hall call response times in 15 second increments per direction and total

.10 Average hall call response times per direction and total

.11 Number of calls registered per landing per direction

.12 Average waiting time per landing, per direction of calls and total

.13 Percentage of up to down calls

.14 Hall call distribution

.15 Safety circuit faults

.16 Emergency operations (i.e. fire service and emergency power)

.17 Instances of power fluctuation problems

.18 Number of cars in normal group service

2.13 Door Operator, Door Detector and Entrance Equipment

.1 Provide GAL MOVFR operators.

.2 Provide GAL hall landing door interlock and pick up assemblies.

.3 Provide GAL car door restrictor device and car door clutch.

.4 Provide GAL car door gate switch.

.5 Provide car door with new electronic, infra red multi beam detector extending the approximate full height of the door. Acceptable detectors shall be limited to the following:

.1 Adams Gatekeeper Max

.2 Pana-80

.6 Where door detector has 3D sensing feature, set up and adjust door detector so that this feature is deactivated.

.7 Protective device shall be designed to project a multiple beam array of invisible light paths across more than 90% of the clear car door opening.

.8 Operation of the door protective device shall be motionless and noiseless.

.9 Door detector unit shall be provided with nudging feature.

.10 Provide detector unit with audible annunciator. Annunciator shall sound whenever a light beam is disrupted. Operation of annunciator shall be controlled by dipswitch or other adjusting means so that U of T may decide to silence annunciator (except under nudging operation).

.11 Adjust detector to time out whenever device is interrupted for period in excess of 20 seconds.

.12 When indicator is timed out, arrange operator to close doors under reduced torque. Provide loud warning buzzer, mounted on car, to sound whenever doors are closing independent of detector unit.

.13 On elevators designed to accommodate Class C3 concentrated loading, provide suitable structural supports for landing sills, designed to accommodate anticipated heaviest single piece load without permanently deflecting or deforming the sill.

.14 Provide in each landing door panel a means of unlocking the landing door from the hoistway side, when the elevator cab is not at that landing. Means to consist of lunar key device, suitable to function with GAL landing door interlocks. Provide stainless steel ferrule in all openings to span gap between landing door panel skins.

2.14 Cab Enclosure

.1 Cab enclosure finishes to be of durable construction and resistant to scratches and vandalism.

.2 Car door panels shall be clad in textured polished metal, pattern 5WL. Leading edge of each door panel shall be provided with binder strip or metal cladding shall be

wrapped around leading edge of door panel and return 25 mm along the hoistway side of the panel.

.3 Cab flooring shall be of resilient construction. Where tiles are used, provide a minimum of 10% spares for U of T's "attic stock".

.4 For service elevators, car sill shall be nickel silver. For passenger cars, extruded aluminum sills may be used, except where aesthetics call for use of bronze sills to match cabin interiors.

.5 Cab lighting, where down lights are used shall use multi cluster LED bulbs. Do not use halogen or incandescent or CFL type lamps. Where strip lights are used, provide LED rope lighting in lieu of fluorescent lamps.

.6 Where down lighting is used, include for dimmer switch in car panel to control lighting intensity within the cab.

.7 Provide polished metal handrails running along the full length of each cab non access wall. Return ends of handrails in to face adjacent wall construction. Where possible use flat bar solid metal handrails in lieu of tubular handrail designs.

.8 On service elevators, include 300 mm high flat bar bumper railing, running along the full length of each cab non access wall. Railings shall be solid 6 mm thick stainless steel, and shall be fastened to cab platform as opposed to wall construction to prevent displacement of wall when hit.

.9 Provide stainless steel pad button hooks on each cab wall.

.10 Provide one set of protective pads, sized to suit cabin inside clearances and designed to cover all cab walls including entrance walls with cut outs for car panel and entrance door.

.11 Finished cab flooring shall be installed flush with the top of the car sill. Variance in elevation between the finished floor and the cab sill will not be accepted.

2.15 Remote Cab Licence Provision

.1 Apply to the T.S.S.A. for the remote location of in car license certificates. Include mention of this requirement within the Technical Standards and Safety Authority, Elevating and Amusement Devices Safety Division registration.

2.16 Wiring

1. Provide wiring to interconnect all elevator device including machine room, car, pit and hoistway. Use stranded conductors. Do not use solid copper conductors in any wiring connections.

2. Provide a minimum of 10% spares in all multiple conductor wiring runs.

3. Provide six pair of individually shielded #22 AWG conductors, plus 2 coaxial conductors in all travelling cables for Owner's future use. These are in addition to the required cabling for security card reader and CCTV camera provisions.

4. Shielded and coax wiring shall be run between controller in elevator machine room and

car control panel without breaks, splices or joined connections.

5. Terminate shielded and coax cable in elevator machine room within a junction box or terminal strip mounted in the controller.

6. Provide all wiring, conduit and troughing required within hoistway.

7. Provide wiring with insulated, moisture resistant, and flame retarding outer cover.

8. Provide flexible ETT traveling cables to connect car operating equipment and elevator machine room controller. Cables shall be provided with moisture resistant outer covers. Traveling cables shall be specifically designed for elevator use. Provide a minimum of 10% spare conductors in each cable.

9. Except for armoured flexible conduit, run wiring in metal duct and troughing. Provide troughing and duct with proper covers and end caps. Provide armoured flexible conduit as required.

2.17 Materials

1. Only new materials, components and devices shall be used in the fabrication, construction and installation of the elevator systems.

2. Stainless steel shall be type ASTM type 304, X-L Blend S or #4 satin brushed finish except where finishes are to be mirror polished where they shall be ASTM type 304 X-L buff finish.

3. Fasteners in fixture faceplates shall match the finish of their respective faceplates.

4. Non polished metal surfaces shall be constructed from pickled sheet steel. Steel shapes and members shall be free of defects.

2.18 Engraving and Signage

.1 All engraving shall be filled with black colored, permanent epoxy paint, except where such engraving is required by Code to be red.

.2 Use internationally recognized symbol to designate car-operating controls as much as possible. Where written instructions or designations must be used, provide instructions in English. Clearly show on shop drawings all instances where written instructions or designations are used.

2.19 Proprietary and Prototype Equipment

.1 Provision of proprietary equipment, limited or restricted access software and diagnostic tools, or equipment designed with automatic “time out” or “shut down” features will not be accepted.

.2 Provide University of Toronto with all diagnostic tools, equipment, software and manuals to allow others to undertake equipment maintenance other than the original installer.

.3 Under no circumstances shall prototype components or equipment be provided.

2.20 Annunciator Panel

.1 Provide at the Building EVAC station or within the CACF room an elevator annunciator panel containing remote fire emergency Phase 1 recall operation key switches (one per car or group of elevators), emergency power status lights (one per car or group of elevators), and two way voice communication to permit direct communication from annunciator panel to each and every elevator cab within the Building.

.2 Include all required interconnecting wiring running between elevator hoistway at grade level to annunciator panel.

3. EXECUTION

3.1 Installation

.1 Locate equipment machine rooms so they are conveniently located to their respective hoistways.

.2 Do not locate or position any non elevator or elevator related equipment within elevator machine room spaces.

.3 Elevator machine room access doors shall be provided with self locking and self closing hardware.

.4 Lighting levels inside elevator machine room spaces shall be a minimum of 200 lux, measured at the floor level with the access door closed.

.5 Elevator machine room spaces shall be provided with air conditioning suitably sized to accommodate the elevator equipment heat release rate.

.6 Elevator pit spaces to be provided with drains.

.7 Elevator pit drains to be designed to accommodate an outflow rate of 3,000 US gallons per hour, per elevator contained within the pit space.

.8 Elevator drain line leading to sump pit to be provided with back flow preventer.

.9 Ensure controller, disconnects and other electrical devices are positioned so that their access panels can be fully opened without making contact with room construction or adjacent devices or equipment.

.10 Provide suitable rail bracket fasteners and make secure attachments to hoistway construction.

.11 Set elevator entrance frames in proper alignment with car platform. Fasten frames to available wall and floor supports.

.12 Install hoistway fascia panels in vertical alignment with entrances, and running the full width of the hoistway. Provide stiffeners and additional brackets to prevent fascia panels, where provided, and hanger covers from warping.

.13 Exposed Work within car enclosure and hall landing entrances shall be fabricated in true

planes. Metal and wood sections shall be installed flat, be securely fastened and aligned to be straight and true. They shall be free of visible imperfections. Joints shall be accurately fitted, aligned and installed in same plane.

3.2 Wiring

.1 Install wiring in neat fashion.

.2 Tie wrap all conductors.

.3 Spare conductors shall be wrapped together and labelled with their ends insulated.

.4 Wiring connections shall be soldered or fastened to terminal strips or studs using approved mechanical fasteners.

.5 Provide wiring harness where multiplicity of conductors are terminated at remote panel terminal strips.

.6 Controller components shall be clearly marked with designations corresponding to those used on electrical circuit drawings.

.7 Provide insulated bushings around openings where travelling cable and other conductor cables are run through rigid structure or panels.

.8 Wiring connections to door detectors shall be protected from chaffing and splitting. Flexible power cord may be used between fixed car wiring and car door detectors as long as its cover is suitably protected.

.9 Run hoistway wiring within conduit or troughing.

.10 All car top and hoistway wiring shall be properly secured and neatly arranged using a minimum amount of flexible armoured conduit.

.11 Where armoured flexible conduit is used, provide conduit supports and fastenings at intervals of not more than 1500 mm (5 feet).

.12 Use proper anti shorts in all conduit connections.

.13 Terminate all spare wires and terminal strip mounted within controller, or neatly secure and bundle up loose conductors into one neat coil.

3.3 Touch Up and Cleaning

.1 Comply with requirements as set out in Division 1.

.2 Remove from all polished metal surfaces, protective wrapping. When the failure to properly remove protective wrapping from moving parts causes scratches or other blemishes in polished metal work visible to the public, the elevator installer shall be responsible to remove damaged cladding and provide new replacement cladding at no additional cost to U of T.

3.4 Painting

1. Comply with requirements of Division 1.

2. Pit equipment, except for machined metal surfaces (i.e. running surfaces of guide rails

and buffer pistons) shall be painted in gloss black enamel.

3. Prime coat painted surfaces shall be finished in manufacturer's standard enamel finish.

4. Factory applied finish paint shall be touched up where damaged. Do not paint over equipment data tags or nameplates.

5. Apply mechanically reproduced car number designation to controller, drive motor and brake housing after finish coat painting.

3.6 Demonstration and Training

1. Provide for one full day, one technically competent technician or crew, conversant with the equipment as installed, to demonstrate system performance and operation to U of T designated staff. Training shall include system troubleshooting and fault look up procedures, fault log clearing procedures, means of safe machine room inspection operation, means to adjust set operating parameters, copying and replacing EEPROM codes, means of adjusting motor acceleration and deceleration rates, means of adjusting car levelling, and other aspects of equipment performance as required for a person expected to service or maintain this equipment. Furnish and provide all tools and training materials as required for this session.

2. Provide for an additional half day, one technically competent technician or crew, conversant with the equipment as installed, to demonstrate elevator remote controls and monitoring system, as well as life safety operations.

END