

SECTION 140001

ELEVATORS

(Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Division of Capital Asset Management at a time and place as stipulated in the "NOTICE TO CONTRACTORS".

The following should appear on the upper left hand corner of the envelope:

NAME OF SUB-BIDDER: (Insert name of sub-bidder)

PROJECT NAME: Elevator Upgrades Project, Holyoke Soldiers' Home

SUB-BID FOR SECTION: 140001 – ELEVATORS

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the Division of Capital Asset Management as required by Section 44F of Chapter 149 of the General Laws, as amended.
3. Sub-bids shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the Commonwealth of Massachusetts in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

C. Sub Sub-Bid Requirements: (None required under this Section.)

D. Reference Drawings: The Work of this Filed Sub-Bid is shown on the following Contract Drawings: ((always insert accurate list of sheet numbers of applicable Drawings)).

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. All Work of Section 14200 – Elevators
2. All Work of Section 14900 – Maintenance

B. Alternates: Number 1 and 2.

END OF SECTION

## STANDARD SPECIFICATIONS

DCAM Standard Specifications are intended for use only on projects of the Division of Capital Asset Management in the Commonwealth of Massachusetts. The specifications are intended to assist the Designer with incorporating DCAM and MGL Chapter 149 filed sub-bid requirements in documents used for bidding and construction. Each section will require editing by a registered architect or engineer before issue.

## NOTES TO THE DESIGNER

None for this section

## RESOURCES

None for this Section

End

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## ELEVATOR MODERNIZATION

### **PART I.**

#### **I.A SCOPE**

1. These specifications cover the repair, rehabilitation and modernization of four passenger elevators in the Holyoke Soldiers' Home, 110 Cherry Street, Holyoke, Massachusetts.
2. The contract is for a complete job in every respect, bidders are cautioned to familiarize themselves with the conditions of the site and the existing equipment.
3. After the contract has been signed, there will be no extra allowed for any labor or material necessary to complete the work, whether exactly described in these specifications or not, as long as such work, labor and material is required in order to obtain the desired effect and result.
4. In all cases where a device or part of equipment is herein referred to in the singular manner, such reference shall apply to as many such devices as are required to complete the work.
5. The work to be done under this specification is as follows:
  - a. Replace two existing geared machines of elevator P1 and P2 with higher speed geared machines with variable frequency, variable voltage motors.
  - b. Alternate 1: Replace existing geared machine of elevator S3 with higher speed geared machine with variable frequency, variable voltage motor.
  - c. Replace hoist ropes of elevators P1 and P2.
  - d. Alternate 1: Replace hoist ropes of elevator S3.
  - e. Replace car governors of elevators P1 and P2 with devices suitable for 350 feet per minute car speed.
  - f. Alternate 1: Replace car governor of elevator S3 with device suitable ofr 350 feet per minute car speed.
  - g. Replace governor rope of elevators P1 and P2.
  - h. Alternate 1: Replace governor rope of elevator S3.
  - i. Replace governor rope tension sheave of elevator P1 and P2.
  - j. Alternate 1: Replace governor rope tensions sheave of elevator S3.
  - h. Replace car controls of P1 and P2 with microprocessor based controls.
  - i. Alternate 1: Replace car control of S3 with microprocessor based control.
  - j. **Alternate 2:** Replace car control of OP4 with microprocessor based control.

- k. Replace motor-generator set of P1 and P2 with IGBT based solid-state drives.
- l. Alternate 1: Replace solid-state motor drive of S3 with IGBT based VVVF drive.
- m. Alternate 2: Replace motor-generator set of OP4 with IGBT based VVVF drive.
- n. Provide for P1 and P2 terminal slowdown operation to permit the reuse of existing 4'6" deep pit.
- o. Alternate 1: Provide for S3 terminal slowdown operation to permit the reuse of existing 4'6" deep pit.
- p. Provide for P1 and P2 new car and counterweight oil buffers.
- q. Alternate 1: Provide for S3 new car and counterweight oil buffer.
- r. Remove group controls of P1 and P2 and replace with microprocessor based control for a two car group with a traditional dispatching system.
- s. Provide for P1 and P2 new car safety and safety plank suitable for 350 fpm car speed.
- t. Alternate 1: Provide for S3 new car safety and safety plank suitable for 350 fpm car speed.
- u. Renovate elevator P1 and P2 hall button stations.
- v. Alternate 1: Renovate elevator S3 hall button stations.
- w. Replace for P1 and P2 hoistway door tracks, hangers and associated equipment.
- x. Alternate 1: Replace for S3 hoistway door tracks, hangers and associated equipment.
- y. Provide for P1 and P2 new closed-loop control, VVVF door operator.
- z. Alternate 1: Provide for S3 new closed-loop control, VVVF door operator.
- aa. Replace P1 and P2 car operating panel.
- ab. Alternate 1: Replace S3 car operating panel.
- ac. Alternate 2: Replace OP4 car operating panel.

#### **I.B CODES AND ORDINANCES**

1. Do all work in accordance with the building codes, by-laws, regulations and requirements of the local, state and federal authority in effect at the time of the execution of the work.
2. Supply all equipment and do all work in accordance with the latest requirements of the Massachusetts State Building Code and ASME/ANSI A17.1 and A17.3.

3. Prior to submission of bid and throughout the duration of the work, give prompt notification in writing of any regulations or requirements known to be in process which might affect the acceptability of the completed installation.
4. If changes in codes or regulations result in extra costs to the elevator contractor, only those taking effect subsequent to the date of bid submission shall be treated as an extra to the Contract.

#### **I.C DEFINITIONS OF TERMS**

1. The term architect, as used herein, refers to Steffian Bradley Architects.
2. The terms elevator consulting engineer, consulting engineer or engineer, as used herein, refers to Jenkins & Huntington Inc.
3. The terms elevator contractor or contractor, as used herein, refers to any person, partners, firm or corporation having a contract with the owner to furnish labor and materials for the execution of the work herein described.
4. The term sub-contractor, as used herein, refers to any person, partners, firm or corporation having a contract with the contractor to furnish labor and materials for the execution of the work herein described.
5. The term inspecting authorities, as used herein, refers to authorized agents of governments and of insurance groups which are charged with the responsibility of carrying out periodic inspections and tests on vertical transportation equipment.
6. All terms in the specifications that are not otherwise defined shall have the definitions as given in the ANSI A17.1 Code for Elevators, Dumbwaiters, Escalators and Moving Walks.

#### **I.D SUBMISSION OF BID**

1. Submission of bid will be considered presumptive evidence that contractor is conversant with local facilities and conditions, requirements of the documents and of pertinent state and local codes, state of labor and material markets, and has made due allowance in his proposal for all contingencies.
2. Bidders are instructed to submit prices on Group P1 and 2 and Alternates 1 and 2 for elevators S3 and OP4, respectively. A bid form is included with these specifications. All bidders are required to use this form when submitting their bids.

#### **I.E WITHDRAWAL OR REJECTION OF PROPOSALS**

1. The owner reserves the right to reject any or all bids or tenders and to waive any conditions.
2. Bids or tenders may not be withdrawn until sixty days after the scheduled date for the receipt of tenders.

#### **I.F TAXES**

1. The owner will provide the successful bidder with a Certificate of Capital Improvement. Proposals for work to be done and materials and equipment to be furnished on the job are to include no local, state and federal taxes.
2. In the event additional taxes or assessments are imposed after the signing of the contract, same to become due on consummation of the contract, these are to be paid, in addition to the original contract amount, by the owner's agent to the contractor, who in turn is to pay them to the proper authorities.

#### **I.G CHANGES IN WORK**

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

#### **I.H ACCELERATION OF WORK**

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

#### **I.I OVERTIME PREMIUM**

1. In the event that the owner's agent, for whatever reason, pays for overtime worked to complete the work as set out in this specification, he shall pay only the added approved cost of the overtime.
2. The added cost shall be the difference between the actual overtime cost and actual straight time cost.
3. The actual cost shall be that amount that the contractor is required to pay to his employees on the job site together with any amounts that he is required to pay on their behalf in contributions to various fringe benefits.
4. Obtain from the owner's agent prior written authorization for overtime to be worked and chargeable, as described above, to the owner's agent. This authorization shall be for specific amounts and for specific times.
5. Submit time sheets for all such overtime worked for approval to the owner's agent or his designated representative within 48 hours of the time that such overtime is worked.

6. If the procedures as set out above are not followed, the contractor assumes all costs of the time worked.

**I.J OWNER'S RIGHT TO DO WORK**

1. If the contractor shall neglect to prosecute the work properly or fail to perform any provision of the contract, the owner's agent after three days written notice to the contractor may, without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost therefrom payment due to the contractor.
2. The owner, the owner's agent or a contractor working for the owner shall have the right to work on any piece of equipment owned by the owner.

**I.K PAYMENT WITHHELD**

1. Approval for payment may be withheld on any request to such extent as may be necessary to protect the owner from loss on account of:
  - a. Defective work not remedied.
  - b. Claims filed or reasonable evidence indicating probable filing of claims.
  - c. Failure of contractor to make payments properly to sub-contractors or for material and labor.
  - d. A reasonable doubt that the contract can be completed for the balance then unpaid.
  - e. Damage to the building or another contractor.
2. When the above grounds are removed, payment shall be made for the amount withheld because of them.

**I.L LIENS AND AFFIDAVITS**

1. Neither the final payment nor any part of the retained percentage shall become due until the contractor shall deliver to the owner's agent a complete release of all liens arising out of this contract or receipts in full in lieu thereof.
2. No partial payment shall become due until the contractor shall deliver to the owner's agent a release of all liens arising out of work for which the payment is sought.
3. No partial payment shall become due until the contractor shall deliver to the owner's agent a release covering the work for which payment is being sought of liens arising out of this contract or receipts in lieu thereof.
4. Furnish an affidavit to the owner's agent that so far as the contractor has knowledge or information the release or receipts include all labor and materials for which a lien could be filed.

5. If any lien remains unsatisfied after all payments are made, refund to the owner's agent all monies that the latter may be compelled to pay in discharging such a lien, including all costs and reasonable attorney's fees.

**I.M LIABILITY**

6. The contractor shall not be liable for any loss, damage or delay caused by acts of government, strikes, riot, civil commotion, war, malicious mischief, act of God or any cause beyond his reasonable control.

**I.N EQUIPMENT INSURANCE**

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

**I.O ASSIGNMENTS**

1. Any assignment or sublet of the contract without the written consent of the owner's agent is null and void.
2. The assignment of any payment due or to become due as a result of this contract without the written consent of the owner's agent is null and void.

**I.P SPECIFICATION CORRECTIONS**

1. Report to the engineer, prior to submission of tender, any discrepancies or ambiguities found in the specifications.

**I.Q MATERIALS AND WORKMANSHIP**

1. Provide all new materials and equipment.
2. Install equipment in a neat, accurate, workmanlike manner.
3. Provide materials and equipment conforming to the regulations of the regulating bodies having jurisdiction over the equipment specified, and to the rules and regulations of the latest requirements of the ANSI A17.1 Code.

**I.R GUARANTEE OF WORK**

1. Guarantee 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 year from the date of acceptance of the equipment.

2. 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.
3. Upon written notice remedy any defects and pay all expenses for any damage to other work resulting from any defects.

**I.S CERTIFICATES OF INSPECTION**

1. Obtain and pay for certificates of approval and all other necessary permits.
2. Should more than one inspection for a license be required due to outstanding work by others, then the contractor shall not be responsible for the cost of the additional inspections, providing the contractor has given sufficient advance notice of such outstanding work to allow the work to be completed by the time of inspection.

**I.T CUTTING AND PATCHING**

1. When it becomes necessary to cut finished materials, submit drawings showing the work required to the owner for acceptance and obtain acceptance before doing such cutting.
2. No cutting or altering the work of the other sections will be permitted without the consent of the owner.

**I.U PROTECTION OF WORK AND PROPERTY**

1. Maintain protection of work and protect the owner's property from injury or loss arising out of the execution of this contract.
2. Make good any such injury or loss, except such as may be directly caused by agents or employees of the owner.
3. On tenant occupied floors wall off the work area in attractive screens or temporary enclosures as approved by the owner.

**I.V REMOVAL OF EXISTING EQUIPMENT**

1. Remove existing equipment which is replaced in the course of work.
2. Any component removed in the course of the modernization shall become the property of the elevator contractor, unless otherwise notified by the owner. The owner shall have the right to retain ownership in any component removed by the contractor.

**I.W REMOVAL OF RUBBISH**

1. 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 the work under this specification is concerned.

#### **I.X SUB-CONTRACTORS**

1. Identify all subcontractors at the time of bid and outline the area of work for each.
2. Bind sub-contractors to all applicable portions of this specification.
3. The contractor shall be responsible for all actions and all work performed by his sub-contractors to the same extent as the contractor is himself responsible under this specification.

#### **I.Y COMPLETION SCHEDULE**

1. Submit with the bid or tender a schedule for delivery and completion of the installation of equipment using all deliberate speed and straight or regular time labor. Any overtime labor or special labor that must be expended by the contractor to make up for slippage in the schedule due to the fault of the contractor will be at the contractor's expense.
2. The schedule should be based on the contractor being able to work on one car at a time..
3. The owner reserves the right to accelerate the schedule based on leasing, or other tenant requirements.
4. A bid form is included with these specifications. All bidders are required to use this form when submitting their bids.
5. Any unreasonable delay in returning approved shop drawings to the contractor will extend the completion date by a corresponding time.

#### **I.Z USE OF ELEVATORS DURING MODERNIZATION**

1. Work will be performed in such a manner that disruption to tenants is minimized.
2. No more than one car is to be taken out of service at a time.

#### **I.AA CANCELLATION**

1. The owner reserves the right to cancel the contract for the installation of the elevator described in this specification at any time before the shop drawings are approved.
2. If the contract is canceled by the owner, the contractor shall be entitled to compensation for all expenses covering engineering, shop drawing preparation and reasonable overhead.
3. The reasonable expenses of cancellation at the time of shop drawing submission will be submitted with the bid at the time of the bid on the bid form.

#### **I.AB OPERATION BY HANDICAPPED PERSONS**

1. Arrange all controls and fixtures so that they can be readily operated by handicapped persons.

2. Provide all raised markers and tactile indications required by code.

#### **I.AC INSPECTION AND ACCEPTANCE**

1. When completed, carry out an inspection, witnessed by the engineer, to see that the work is in compliance with the specification.
2. Provide the necessary test weights to carry out full load tests.
3. Furnish a team of competent people, for one working day, to assist in making these inspections.
4. If the results of these inspections do not meet the requirements of the specification, make the appropriate corrections, and provide, as set out above, for another inspection.
5. Give sufficient advance notice in writing so that the engineer can arrange for his/her representative to witness these inspections.

#### **I.AD WORK BY OTHERS**

1. Work not included in this specification which presently exists or may be required in conjunction with the installation will consist of the following items.
  - a. In the machine room, two 15 ampere, 120 volt, single phase circuit breakers for each elevator, located adjacent to the lock side of the machine room door.
  - b. Permanent power supplied to the controller cabinets capable of supplying the following power:
    - (1) Elevators P1 & P2, , 260 amperes starting and 110 amperes running at 208 volts, under full load up conditions (30 hp motors).
    - (2) Elevator S3 & OP4, , 230 amperes starting and 100 amperes running at 208 volts, under full load up conditions (25 hp motors).
  - c. In the machine room, fluorescent lights, located in front of and behind each controller at approximately eight feet from floor level and such additional fluorescent lighting as required to give a minimum illumination at floor level of 15 foot-candles. The light switch to be located adjacent to the lock side of the machine room door.
  - d. In the machine room, GFI duplex receptacles mounted on the wall, spaced at approximately fifteen foot intervals and located clear of the elevator equipment.
  - e. In the machine room, shunt-trip disconnects as required when fire sprinklers as present.
  - f. In the pit, protected lights, located clear of elevator equipment to give a minimum illumination at pit level of 15 foot-candles. The light switch to be located adjacent to the pit entrance.
  - g. In the pit, GFI duplex receptacles mounted on the wall, spaced at approximately fifteen foot intervals and located clear of the elevator equipment.

- h. The connection of the telephone to the local telephone system (wiring from cab to machine room by the elevator contractor).
- i. Electric power during erection, for illumination, operations of tools and hoist, starting, testing and adjusting.
- j. Heating and cooling for the machine rooms in order to maintain continuously (i.e. 24 hours a day) a temperature of greater than 55 degrees Fahrenheit and less than 90 degrees Fahrenheit and relative humidity of less than 85% based on 10,000 BTU per hour, per elevator during the working day.
- k. State on the bid form any additional work, equipment or protection that must be performed by others.

## **PART II**

### **II.A DESCRIPTION**

#### **1. Number**

- a. Two tower passenger elevators designated P1 and P2
- b. Alternate 1: One tower service elevator designated S3.
- c. Alternate 2: One Out Patient Services elevator designated OP4.

#### **2. Speed**

- a. Adjust passenger elevators P1 and P2 to operate at 350 feet per minute full load up, and under any condition of loading, except the case of overload, within 1.5% of the contract speed.
- b. Alternate 1: Adjust service elevator S3 to operate at 350 feet per minute full load up, and under any condition of loading, except the case of overload, within 1.5% of the contract speed.
- c. Alternate 2: Adjust passenger elevator OP4 to operate at 200 feet per minute full load up and under any condition of loading, except the case of overload within 1.5% of the contract speed.

#### **3. Stops & openings**

- a. Retain existing stops and openings.
- b. Perform repairs, rehabilitation and replacement work as outlined below.

### **II.B MISCELLANEOUS**

#### **1. Parts**

- a. Supply parts on request for a period of fifteen years subsequent to final acceptance of the equipment, at then prevailing prices.
- b. Where purchased components are used, ensure that the original manufacturer's name and component designation are clearly marked on the part or in the parts catalogue supplied in accordance with this specification.

#### **2. Painting**

- a. Ensure that all newly installed equipment, except for machined surfaces and non-rusting surfaces, is protected with two heavy double coats of rust inhibiting primer of a neutral color.

#### **3. Hoistway partitions**

- a. Installation, maintenance and removal of temporary partitions between elevator shafts is the responsibility of the elevator contractor.

**4. Electrical diagrams**

- a. Supply wiring diagrams and data as required for the execution of the work herein described.
- b. Supply, at the time of the final acceptance, three prints and one sepia of the wiring and schematic diagrams revised to show all changes that have been made.
- c. If, in the course of the maintenance contract, changes are made to the wiring or control, supply two sets of marked-up prints of the altered schematics and field wiring diagrams showing the changes.

**5. Solid-state control drawings**

- a. Supply, at the completion of the installation, with changes incorporated as necessary to correspond to the completed installation, flow diagrams and Boolean diagrams showing the operation of any solid state systems or devices employed.

### PART III

#### III.A MACHINE ROOM EQUIPMENT

1. **Machine location:** Mount the machine directly over the hoistway on structural steel beams or channels, provided in place with any necessary bearing plates.
2. **Machine:**
  - a. Replace geared traction machines P1 and P2 with new, variable voltage, variable frequency geared machine.
  - b. Alternate 1: Replace geared traction machine S3 with new, variable voltage, variable frequency geared machine.
  - c. Provide a geared machine, consisting of a slow speed variable frequency, alternating current motor, connected to a brake drum, worm gear, ring gear and drive sheave. Acceptable manufacturer shall be Hollister-Whitney or preapproved equal.
  - d. Provide anti-friction bearings equipped with suitable means for lubrication.
  - e. Provide a spring applied, electrically released, brake designed to apply instantly and automatically in the event of interruption of power supply to the motor by any cause.
  - f. Provide equipment that will deliver its rated output continuously with a temperature rise not to exceed 90 degrees F.
  - g. Number all machines, control and power conversion units.
  - h. Support secondary deflector sheaves integrally from a unitized elevator bed plate.
  - i. Arrange, with by incorporating the deflector sheave as part of the machine or by using two sheaves on the car crosshead, so that no secondary level is required.
  - j. Resiliently isolate the entire elevator machine/secondary deflector integral unitized base from the elevator machine room floor slab by means of effective neoprene-in-shear isolators having a minimum static deflection of 3/8".
3. **Governor**
  - a. Provide for elevators P1 and P2 a governor that will operate the new car safety whenever the car velocity is more than 120% of contract speed in the down direction.
  - b. Alternate 1: Provide for elevator S3 a governor that will operate the new car safety whenever the car velocity is more than 120% of contract speed in the down direction.

- c. Provide the governor, a properly sized and tagged rope and a tension frame in the pit.

#### **4. Controller**

- a. Provide a microprocessor based, group supervisory controller for passenger cars P1 and P2 to give the required operation as herein specified.
- b. Provide a microprocessor based car controller for elevators P1 and P2 designed to give the required operation as herein specified. Acceptable manufacturers are CEC - Swift Futura, MCE - I Box, GAL - Galaxy or preapproved equal.
- c. Alternate 1: Provide a microprocessor based car controller for elevator S3 designed to give the required operation as herein specified. Acceptable manufacturers are CEC - Swift Futura, MCE - I Box, GAL - Galaxy or preapproved equal.
- d. Alternate 2: Provide a microprocessor based car controller for elevator OP4 designed to give the required operation as herein specified. Acceptable manufacturers are CEC - Swift Futura, MCE - I Box, GAL - Galaxy or preapproved equal.
- e. Mount all panels securely on substantial, self supporting steel frames designed for floor or wall mounting.
- f. Provide completely enclosed controllers with covers. Do not mount equipment on the covers.
- f. Where relays are used, provide those having a design electrical life and mechanical life equivalent to thirty years operation in the given application, with their contacts designed for maximum conductivity and wiping action.
- g. Provide electronic time delay devices which employ stable capacitors or crystals as the time base.
- h. Install wiring on the controller, whether control or field wiring, in a neat workmanlike order and make all connections to studs and terminals by means of solder or solderless lugs, or similar connecting devices.
- i. Mark all relays, contractors, fuses and printed circuit board components et cetera clearly and permanently with designations as shown on the schematics.

#### **5. Solid state motor drive**

- a. Provide a solid state motor drive employing internal gate bi-polar transistors (IGBT's) to meet the following requirements:
  - i. Arrange that the system in responding to a unit step function does

- not overshoot by more than 22 percent.
- ii. Arrange that the error signal does not, in normal operation, exceed 3.5 percent.
  - iii. Provide means to shut down the unit in the event that the error signal exceeds 3.0 percent.
  - iv. Provide means to limit the line notching to a maximum of 3.7 percent.
  - v. Arrange that the harmonics generated by the IGBT switching do not exceed, in instantaneous energy, 0.8 percent of the fundamental line frequency.
- b. Provide means to limit the noise levels and changes in noise levels during acceleration to less than those generated by a motor-generator set in a similar application.
  - c. Arrange the equipment so that any vibration generated is not transmitted directly to the building structure.
  - d. Provide electronic feedback circuits to limit the current through the IGBT's and the motor. Arrange that under low voltage conditions the unit does not exceed the current limits.
  - e. Provide safety circuits to prevent runaway in the event of closed loop feedback circuit failure.
  - f. Arrange these circuits so that with a partial or complete loss of the feedback signal the elevator will stop before the governor jaws are tripped and that, if the elevator is in the leveling zone with the door interlock circuit open, the elevator will top prior to leaving the leveling zone. Test these circuits by opening the feedback circuit while the elevator is running at contract speed no load up and while the elevator is leveling into the floor no load up.
  - g. Provide means for dissipating the heat generated by the IGBTs.
  - h. Provide safety circuits to shut down the unit in the event of overheating.
  - i. Provide a fast acting fuse in series with each IGBT to protect against surge currents.
  - j. Design the equipment so that power loss or power fade (brownout) does not cause fuses to blow.
  - k. Provide fully regenerative power.

- I. Mount the IGBT, any transformers and filters on neoprene mounts with minimum 0.25" thickness, similar to Mason Industries, type ND.

**6. Feedback speed control**

- a. Provide a closed loop, feedback control system.
- b. Include in the system the following features:
  - i) A pattern generator to give a velocity input signal modified by position with constant peak acceleration and constant peak change of acceleration;
  - ii) A digital or analog tachometer generator to provide a velocity feedback signal;
  - iii) A digital transducer to provide a position feedback signal;
  - iv) A current transformer to provide a current feedback signal;
- c. Provide the following safety devices:
  - i) Means to stop the elevator in the event that the error exceeds five percent of the signal;
  - ii) Means to stop the elevator in the event the acceleration exceeds the normal acceleration by more than fifteen percent;
  - iii) A circuit to cut off power in the event of excessive transistor switching time;
  - iv) Means to cut off power in the event of overheating of the solid state components;
  - v) A circuit to cut off power in the event of a disagreement between the position as derived from the digital transducer and the position as derived from the integration of the velocity feedback signal;
- d. Arrange the response of the system so that the elapsed time between the detection of a fault and the cut off power does not exceed 100 milliseconds.
- e. Provide protective devices so arranged that any one fault will not cause risk of injury to the passengers.
- f. Arrange that, if a fault occurs such that a subsequent fault could cause an unsafe condition, the fault will be detected and the elevator shut down.

**7. Car position transducer**

- a. Provide a position transducer device to transmit to the control system the movements of the elevator, either by direct connection to the elevator or by electrical coupling.
- b. If the device is electrically coupled, use selsyn, magnetic switches, photo-diode counters or other solid state devices for the stepping.
- c. Do not use electro-mechanical stepper switches.
- d. Arrange the device to provide the electrical impulses for signal devices such as position indicators, to initiate deceleration and to cancel answered calls.
- e. Design the device so that the parts are readily accessible for easy adjustment.

**8. Computing devices**

- a. Where computing devices are used, such as microprocessors or mini-computers, along with associated devices, design to the following requirements:
  - i) Isolate the inputs from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices.
  - ii) Provide the control program on read-only memory with a minimum of 40 percent spare capacity, to allow for future programming modifications and extensions.
  - iii) Provide crystal regulation of frequency.
- b. Provide for separate regulated power supplies to serve each micro-processor system.

**9. Control circuits grounding**

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

**10. Solid-state hardware**

- a. Mount solid-state devices, except for high power silicon controlled rectifiers and rectifiers, on removable printed circuit boards.
- b. Gold plate the contact points of edge connectors.
- c. Coat the circuits with tin-lead.
- d. Provide a solder resistant screen.
- e. Provide plated through holes for double sided boards.
- f. Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.
- g. Do not provide "patched" connections.
- h. Design solid-state devices for a high level of noise immunity.
- i. Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associates with the solid-state circuits.

**11. Ascending car overspeed protection**

- a. Provide for elevators P1 and P2 ascending car overspeed protection as follows:
- b. Alternate 1: Provide for elevator S3 ascending car overspeed protection as follows:
- c. Alternate 2: Provide for elevator OP4 ascending car overspeed protection as follows:
  - i) Ascending car overspeed protection shall be provided to prevent the car from striking the hoistway overhead structure as a result of a failure in:
    - ii) the electric driving machine motor, brake, coupling, shaft, or;
    - iii) the control system;
    - iv) any other component upon which the speed of the car depends, except the suspension ropes and the drive sheave of the traction machine.
- d. This device shall detect an ascending car overspeed condition at a speed not greater than 10% higher than the speed at which the car governor is set to trip.

- e. Once actuated by overspeed, the overspeed detection means shall remain actuated until manually reset, and the car shall not start or run unless the detection means is reset.
- f. If the overspeed detection means requires electrical power for its functioning, a loss of electrical power to the ascending car overspeed detection and control means shall cause the immediate activation of an emergency braking device.

**12. Unintended car movement**

- a. Protection shall be provided with a device to prevent unintended car movement away from the landing with the hoistway door not in the locked position and the car door not in the closed position, as a result of failure in
  - i) the electric driving machine motor, brake, coupling, shaft or gearing;
  - ii) the control system;
  - iii) any other component upon which the speed of the car depends, except the suspension ropes and the drive sheave of the traction machine.
- iv) Once actuated, the unintended car movement device shall remain actuated until manually reset, and the car shall not start or run unless the detection means is reset.
- v) If the overspeed detection means requires electrical power for its functioning, a loss of electrical power to the ascending car overspeed detection and control means shall cause the immediate activation of an emergency braking device.

- 13. Operating Temperatures:** Arrange that the equipment be capable of operating normally and withing the requirements of the specifications when the ambient temperature is between 55 and 90 degrees Fahrenheit and at or below 85% relative humidity.

**III.B CAR EQUIPMENT**

**1. Car Operating Panel:**

- a. Provide for elevators P1 and P2 complete new car operating panels. Include all buttons and devices necessary for the operation of the car including digital car position indicator a minimum of 2 inches high, lockable service cabinet with key switches for car shutoff, independent service, inspection operation, car lighting, car ventilation, test button for emergency car lighting and alarm bell, GFIC duplex receptacle and door protection.
- b. Alternate 1: Provide for elevator S3 complete new car operating panel. Include all buttons and devices necessary for the operation of the car including digital car position indicator a minimum of 2 inches high, lockable service

- cabinet with key switches for car shutoff, independent service, inspection operation, car lighting, car ventilation, test button for emergency car lighting and alarm bell, GFIC duplex receptacle and door protection.
- c. Alternate 2: Provide for elevators OP4 complete new car operating panel. Include all buttons and devices necessary for the operation of the car including digital car position indicator a minimum of 2 inches high, lockable service cabinet with key switches for car shutoff, independent service, inspection operation, car lighting, car ventilation, test button for emergency car lighting and alarm bell, GFIC duplex receptacle and door protection.
  - d. Provide for elevators P1 and P2 lockable Firefighters Service cabinet in accordance with Mass Elevator Code.
  - e. Alternate 1: Provide for elevator S3 lockable Firefighters Service cabinet in accordance with Mass Elevator Code.
  - f. Alternate 2: Provide for elevator OP 4 lockable Firefighters Service cabinet in accordance with Mass Elevator Code.
  - g. Provide for elevators P1 and P2 two-way, hands free communication speaker, speaker grill and microphone and call initiation button. Include visual LED indication of system activation for hearing impaired users.
  - h. Alternate 1: Provide for elevator S3 two-way, hands free communication speaker, grill and microphone and call initiation button. Include visual LED Indication of system activation for hearing impaired users.
  - i. Alternate 2: Provide for elevator OP4 two-way, hands free communication speaker, grill and microphone and call initiation button. Include visual LED indication of system activation for hearing impaired users.
  - h. Provide for elevators P1 and P2 a telescoping toe guard on the forward edge of the platform. Arrange that the lower portion of the guard slides upward when it contacts the pit floor and returns to code compliant length as the car leaves the lowest floor.
  - i. Alternate 1: Provide for elevator S3 a telescoping toe guard on the forward edge of the platform. Arrange that the lower portion of the guard slides upward when it contacts the pit floor and returns to code compliant length as the car leaves the lowest floor.

## 2. Signal lights

- a. Provide car position indicators and car call registered lights having a minimum contrast ration of 8:1 throughout a life expectancy greater than 10,000 hours.

- b. The contrast ratio is to be determined by subtracting the brightness of the Indicator background from the brightness of the marking (LED, LCD or Lamp) and then dividing the result by the brightness of the background.
  - c. Arrange that the variation in intensity and contrast ration between position indicators within the car does not exceed 5 percent.
  - d. Arrange that the variation in intensity and contrast ratio between car call registered lights within the car does not exceed 5 percent.
  - e. All measurements are to be made in the normal ambient light of the cab.
- 3. Car top power supply**
- a. Provide on top of cars P1 and P2, a 110 volt, A.C., power supply for a car top mounted closed circuit television camera.
  - b. Alternate 1: Provide on top of car S3 a 110 volt, A.C. power supply for a car top mounted closed circuit television camera.
- 4. Car roller guides**
- a. Provide for elevators P1 and P2 all new roller guide rollers.
  - b. Alternate 1: Provide for elevator S3 all new roller guide rollers.
  - c. Provide rollers true and free from deformations of the surface so as to provide a smooth and even ride of the elevator.
  - d. Grind the rollers within a tolerance of 0.002 inch total indicator reading.
- 5. Car ride**
- a. Statically balance the car so that, at the center of travel with the guides removed, the car hangs in the center of the rails.
  - b. Arrange the equipment so that there is, in this position, with the guides properly adjusted, no force upon the rails.
  - c. Make the test with an empty car and car doors closed.
  - d. Realign guide rail joints causing an unloaded car traveling at rated speed to accelerate laterally at no more than 15 milli-g's on either horizontal axis.
- 6. Car safeties**

- a. Provide for elevators P1 and P2 new car safety and safety plank suitable for the new car speed.
- b. Alternate 1: Provide for elevator S3 new car safeties and safety plank suitable for the new car speed.

### III.C DOOR EQUIPMENT

#### 1. Door operator

- a. Provide for elevators P1 and P2 a new door operator to open and close the car and hoistway doors simultaneously. Provide a door operator that is capable of moving the door panels from the closed position to within three inches of the fully open position at an average speed of not less than three feet per second.
- b. Alternate 1: Provide for elevator S3 a new door operator to open and close the car and hoistway doors simultaneously. Provide a door operator that is capable of moving the door panels from the closed position to within three inches of the fully open position at an average speed of not less than three feet per second.
- c. Provide an A.C. variable voltage, variable frequency (VVVF) motor with associated speed and torque control for the door operator.
- d. Provide closed loop, feedback control for the door operator and to control the movement of the doors.
- e. Provide new mechanical linkages to power the new door panels and connect with the new door operator.
- f. Check the movement of the doors at both limits of travel.
- g. Design the door operator and associated components for a minimum of noise.
- h. Locate the controls for the adjusting and regulating of the door operator acceleration, deceleration and running speeds for convenient access on the top of the cab adjacent to the door operator.
- i. Provide means to automatically recycle the doors in the event that they stall during the opening or closing operations.
- j. Clean, lubricate and adjust linkages and arms and replace bushings and bearings, as required.

#### 2. Proximity device:

- a. Provide for elevators P1 and P2 electronic or ultrasonic proximity device to

detect people or objects in the path of the closing doors. The device shall be able to sense the presence of people or objects without touching them. The device shall generate a zone of detection to a height of six feet or more.

- b. Alternate 1: Provide for elevator S3 electronic or ultrasonic proximity device to detect people or objects in the path of the closing doors. The device shall be able to sense the presence of people or objects without touching them. The device shall generate a zone of detection to a height of six feet or more.

**3. Floor Indications:**

- a. Provide for elevators P1 and P2 hoistway entrance jambs tactile markings where missing of a type and design required by code in a graphic style to be determined by the architect.
- b. Alternate 1: Provide for elevator S3 hoistway entrance jambs tactile markings where missing of a type and design required by code in a graphic style to be determined by the architect.
- c. The markings are to be located on both sides of the jamb approximately 60 inches off the finished floor.
- d. The floor markings are to be a minimum of 2.5 inches high and raised 0.030 inches above the background.
- e. Markings shall be polished stainless steel.

- 4. Hoistway door inside markings:** Identify each landing by means of marking on the inside of the hoistway doors. Place the markings so that people in a stalled elevator will be able to readily see the floor that the car is approaching or passing upon opening the car doors.

**5. Door hardware**

- a. Replace and adjust hoistway door hangers, hanger track, rollers, up-thrusts, tracks, gibs, gate switch and associated equipment of elevator P1 and P2.
- b. Alternate 1: Replace and adjust hoistway door hangers, hanger track, rollers, up-thrusts, tracks, gibs, gate switch and associated equipment of elevator S3.

**III.D HOISTWAY EQUIPMENT**

**1. Rail alignment**

- a. Clean and realign existing car and counterweight rails of elevators P1 and P2. Tighten and secure rails to existing brackets.

- b. Alternate 1: Clean and realign existing car and counterweight rails of elevator S3. Tighten and secure rails to existing brackets.
  - c. Align guide rails with a variation of not more than 0.06 inches over any twenty foot section and with a maximum variation of not more than 0.003 inch in one inch.
  - d. Clamp the guides to the bracket with the clips so as to prevent the rail from sliding with vertical force of less than 250 pounds and so as to allow the rail to slide if the vertical force exceeds 500 pounds.
2. **Hoistway screening:** provide wire fencing or other screening material if required while working on elevators P1 and P2.
3. **Hoistway cleaning**
- a. Brush down the hoistway removing any accumulated dust, debris and dirt.
  - b. Clean all door sills.
  - c. Clean all car tops.
  - d. Clean pits.

### III.E HALL FIXTURES

1. **Hall buttons**
- a. Rebuild hall buttons stations of elevator P1 and P2 with new buttons and key switches.
  - b. Alternate 1: Rebuild hall buttons stations of elevator S3 with new buttons and key switches.
2. **Hall fixtures**
- a. Reuse and rehabilitate hall lanterns as necessary to comply with State and Federal ADA requirements.
3. **Elevator management system**
- a. Provide at the Building Operations office an IBM personal computer or an approved equal with an Intel Pentium IV microprocessor operating at a clock speed of one gigahertz or faster with a minimum 60 gigabit hard drive, a CD drive, a serial, parallel and USB ports, a color TFT flat panel display and keyboard.
  - b. On the monitor show the continuous position and status of all elevators with

new controllers together with all changes in elevator status such as car call button actuation, hall call button actuation, car position, door open, door closed, door protective device actuation, running up, running down and load switch operation.

- c. Arrange this monitor to display the status of all elevators at the same time in a general display with the ability to switch to a detailed presentation of a group and of an individual elevator.
- d. Provide a minimum resolution of 800 wide by 500 high with minimum 16 colors.
- e. Provide a keyboard to enter commands for selection of the various displays and other such directions.
- f. Submit for review, a detailed description and drawings of the proposed display complete with examples of layout, symbols, enclosure and finishes.
- g. Provide the following switches, signals and functions:
  - i. Group emergency service operation indication (Fireman's Service Phase I, one for each group or unit).
  - ii. Car emergency service operation indication (Fireman's Service Phase II, one for each car).
  - iii. Distress light and buzzer (for each car).
  - iv. Communication station.
  - v. Emergency power selector.
  - vi. Group emergency power indication
  - vii. Car position indicator incorporating car direction.
  - viii. Door status indicator (for each car).
  - ix. Independent service function (for each car).
  - x. Group/independent service pilot light (for each car).
  - xi. Dispatching mode (for each bank).
  - xii. Return to lobby (parking) function (for each car).
  - xiii. Floor cut-out function (one for each floor).
  - xiv. Floor cut out status.

- xv. Individual car dispatching function.
  - xvi. Hall call registration.
  - xvii. Car call registration.
  - xviii. Any items defined elsewhere in the specifications as located in the central control panel.
- h. Connect all wiring to terminal blocks mounted at the panel.
  - i. Locate and identify these terminal blocks so that external wiring can be readily connected to the terminals.
  - j. Provide all wiring from the elevator controllers to the terminal blocks.
  - k. Submit with bid drawings showing the design, finish and space requirements.
  - l. Provide in the computer the ability to interrogate the group and car controllers and retrieve the following information:
    - i) Events, such as changes in the status of switches or components in the safety chain.
    - ii) Performance data, such as floor to floor times, door open times, door close times, speeds and accelerations.
    - iii) Extra-ordinary events, such as incidents of door nudging, alarms, cab loading, releveling, etc.
  - m. Provide software to store selected data on the hard disk as chosen from the keyboard in either a revolving manner or during a defined period of time as chosen from the keyboard.
  - n. Provide software that is compatible with Windows XP or 7 and can be downloaded via Ethernet.

### III.F WIRING

#### 1. Electric wiring

- a. Provide all new hoistway wiring to interconnect the equipment.
- b. Provide new 120 volt, single phase wiring for cab lighting from the mid-hoistway junction box at the center of the hoistway to the cab.
- c. Provide insulated copper wiring having a flame retarding and moisture resisting outer cover and rating required by code.

- d. Where shielded wire is specified, provide wire of not less than 0.95 mm thickness having individually shielded pairs with 100% shielding.
- e. Provide color coded wires in multi-wire cables.
- f. Provide waterproof terminal labels.
- g. Provide stranded field wire except for the individual wires in multi-wire cables which may be either stranded or solid.
- h. Provide new flexible traveling cables to connect car operating panels and other car operating devices to the controller in the machine room.
  - 1. Supply cables with flame-retarding and moisture-resisting covers and stranded conductors.
  - 2. Supply cables approved for elevator use.
  - 3. Provide ten percent additional minimum spare wires in each cable.
  - 4. Provide at least ten pair (minimum 20 gauge) shielded wires for audio, video or other electronic equipment, running from top of the elevator cab to the car junction box, from the hoistway junction box to the machine room controller, and, if a central control console is provided, from the machine room controller to the central control console.
  - 5. Terminate cables on terminal blocks having identifying numbers to facilitate replacement and service.
- i. Provide a minimum of ten percent spare wires throughout the elevator wiring signal runs.

2. **Video Wiring**

- a. Provide two RG6U coaxial cables from the car to the central control console for the transmission of video signals.
- b. Provide, as required, hoistway wiring, machine room wiring, wiring from the machine room to the central control console, traveling cables, car wiring, terminal blocks and junction boxes.
- c. Connect the wiring to a terminal block mounted on the top of the car or adjacent to the device.
- d. Terminate the wiring in the central control console at a separate enclosed external terminal block mounted in the console.

- e. So locate the console terminal block and its enclosure that personnel other than elevator mechanics can easily run their wiring to these terminals.
- f. Clearly mark the terminal block.
- g. Continuously connect all conductors from the terminal box on the car to the central control console terminal block or, where joins are necessary, provide compatible connectors or terminal blocks designed to minimize signal degeneration.

### III.G CONTROL AND OPERATION

#### 1. Operation

- a. Provide microprocessor based group supervisory systems for the control of elevators P1 and P2.

#### 2. Call response

- a. Store all hall and car calls in the control memory until answered.
- b. Cancel a call when it is answered by a car.
- c. Cause car calls to be canceled when the car reverses direction.
- d. Cause a car selected by the control system to respond to a registered call.
- e. Prevent more than one car starting to answer any hall call.
- f. Stop a running car at the first landing for which a car call is registered.
- g. Stop a running car for a hall call registered for the same direction as the car is traveling, subject to higher priority assignments and to load in the car.

#### 3. High & low call return

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

opposite direction to the direction of the low car.

**4. Call behind response**

- a. If a hall call exists which cannot be answered by a car in its normal line of travel (e.g. a hall call above a down traveling car) cause another car to be assigned by the dispatch system to answer the call. Under these circumstances, redistribute the remaining cars as required to service other traffic needs.

**5. Direction reversal**

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

**6. Dispatch recovery**

- a. If a hall call remains registered for longer than 60 seconds and within that period the cars are not running, dispatch all cars and run without dispatch delay or assignment until all registered hall calls are canceled.
- b. Illuminate a light, or other such signal device, at the control panel to indicate that such an event had occurred.

**7. Reduced group**

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

**8. Delay protection**

- a. Automatically disassociate a car from group service in the event that the car is delayed for more than a given period of time.
- b. Restore the car automatically to group service when the delay is corrected.
- c. Arrange that the given period of time be approximately one minute but shall be

adjustable from 30 seconds to two minutes.

**9. Coincident calls**

- a. Arrange that an up hall call will be assigned to an up traveling car having a car call at the same floor as the hall call.
- b. Arrange that a down hall call will be assigned to a down traveling car having a car at the same floor as the hall call.

**10. Distress light and buzzer**

- a. Provide, at the central control console, a distress light and buzzer for each elevator, and an acknowledge button common to all elevators.
- b. Arrange the distress lights and buzzers so that the pressure of an alarm button or actuation of the emergency stop switch in the elevator car will cause the distress light to be illuminated and the buzzer to sound.
- c. Arrange the controls so that the distress light be illuminated and the buzzer pulsate if a dispatched car remains at a landing for more than thirty seconds, or if the electrical safety circuit is open.
- d. Maintain the distress light illuminated until the acknowledge button is pressed.

**11. Power interruption restart**

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

**12. Speed control**

- a. Provide a closed loop feedback control system.
- b. Include in the system the following features:
  - i) A pattern generator to give a velocity input signal modified by position with constant peak acceleration and constant peak change of acceleration;
  - ii) A digital or analog tachometer generator to provide a velocity feedback signal;
  - iii) A digital transducer to provide a position feedback signal;

- iv) A current transformer to provide a current feedback signal;
- c. Provide the following safety devices:
  - i) Means to stop the elevator in the event that the error exceeds five percent of the signal;
  - ii) Means to stop the elevator in the event the acceleration exceeds the normal acceleration by more than fifteen percent;
  - iii) A circuit to cut off power in the event of excessive transistor switching time;
  - iv) Means to cut off power in the event of overheating of the solid state components;
  - v) A circuit to cut off power in the event of a disagreement between the position as derived from the digital transducer and the position as derived from the integration of the velocity feedback signal;
- d. Arrange the response of the system so that the elapsed time between the detection of a fault and the cut off power does not exceed 100 milliseconds.
- e. Provide protective devices so arranged that any one fault will not cause risk of injury to the passengers.
- f. Arrange that, if a fault occurs such that a subsequent fault could cause an unsafe condition, the fault will be detected and the elevator shut down.

### **13. Position transducer**

- a. Provide a position transducer device to transmit to the control system the movements of the elevator, either by direct connection to the elevator or by electrical coupling.
- b. If the device is electrically coupled, use selsyn, magnetic switches, photo-diode counters or other solid state devices for the stepping.
- c. Do not use electro-mechanical stepper switches.
- d. Arrange the device to provide the electrical impulses for signal devices such as position indicators, to initiate deceleration and to cancel answered calls.
- e. Design the device so that the parts are readily accessible for easy adjustment.

## **III.H PERFORMANCE**

### **1. Speed control**

- a. Provide a speed control system of the variable voltage type in which control is accomplished by varying the frequency and voltage applied to the elevator motor.

- b. Design and adjust the equipment and control so that an average acceleration over the total accelerating period of not less than 3.0 FPSPS is maintained and the acceleration peaks do not exceed 4.0 FPSPS.

## **2. Operating time**

- a. Adjust the equipment so that the elapsed time to travel one typical floor does not exceed 12.0 seconds.
- b. Measure this time under the following conditions:
  - i) A typical floor shall not exceed 12 feet;
  - ii) Floor level is considered to be within 0.5 inches of level;
  - iii) 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;
  - iv) The time is measured with full load in the car and in both directions of travel, and
  - v) The power door operation for the hall and car doors conforms to the elevator code requirements.
- c. Adjust the equipment so that for other conditions of loading, the time does not vary more than five percent.
- d. 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 so that this operating time can be readily maintained over the life of the elevator installation.
- e. 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. Leveling**

- a. Cause the car to stop automatically at floor level, without overshoot, regardless of load or direction of travel so that the car sill is within 0.25 inches level with respect to the hoistway sill.
- b. Correct for over travel or under travel or rope stretch by returning the car imperceptibly to the floor.

**4. Door operator performance**

- a. Arrange the doors so that the panels glide smoothly and quietly when opening, closing and reversing.
- b. Arrange the doors so that center opening doors operate from a fully closed position to a position fully open in 3.0 seconds.
- c. Arrange the doors so center opening doors operate from a fully open position to a fully closed position in 4.0 seconds.
- d. Arrange the doors so that the force tending to close the panels never exceeds 30 pounds.

**5. Independent service**

- a. Provide independent service.
- b. On independent service remove the car from the automatic operation.
- c. Arrange the circuits so that car does not respond to hall calls.
- d. Cause the car to park with its doors open.
- e. Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up.
- f. Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move.
- g. Render inoperative the normal door protective devices.
- h. Arrange the controls so that the attendant can select direction of travel.
- i. Cancel all registered car calls when the direction reverses or a car call is answered.

**6. Emergency power operation**

- a. The supplier of the emergency power system will arrange that:
  - i) The emergency power source will provide sufficient power to run one elevator per bank at contract speed and capacity,
  - ii) The emergency power will be provided on the same lines and the same disconnect as the normal power,
  - iii) Two wires will run to the elevator controller,
  - iv) These two wires will be shorted together giving a closed circuit to indicate that the

elevator will be supplied by normal power, and

- v) These two wires will give an open circuit to indicate that the elevator will be supplied by emergency power.
- b. The elevator contractor will arrange, under emergency power conditions, the elevator circuits, wiring and controls so that:
  - i) A signal light marked "ELEVATOR EMERGENCY POWER" is illuminated,
  - ii) One car per bank is automatically brought to the main floor until all cars are at the main floor,
  - iii) Any car delayed by some malfunction is by-passed,
  - iv) After all cars are at the main floor with their doors open, arrange that one elevator per bank or any three elevators as pre-selected will run normally answering hall and car calls: these elevators to have their main floor hall lanterns illuminated, and
  - v) The normal safety devices including door open buttons and door protective devices, remain operational
- c. Arrange the control of the elevator so that the elevator rotating equipment and motor drive are not damaged on changeover to and from emergency power because of phase differences. Achieve this by cutting off power to the elevator for a short period of time (normally five seconds) after receiving the power change signal, or by other suitable means.
- d. Arrange the controls of the elevator so that a signal from the emergency power generator indicating that the generator is to be tested will cause the elevator to stop at the nearest landing, open its doors and wait for the testing to begin. When the test has been completed the elevator will return to normal operation. The test signal will be given at least 10 seconds before the test is to begin.

#### **7. Fireman's service**

- e. Provide fireman's service per ASME/ANSI A17.1.
- f. Provide automatic and manual recall.
- g. Provide for each elevator in-car fireman's service operations.

## BID FORM

Bidder: \_\_\_\_\_

Base Bid: Elevators P1 and P2 \$ \_\_\_\_\_

Maintenance, Elevators P1 and P2 \$ \_\_\_\_\_ monthly

Time to Complete Base Bid work: \_\_\_\_\_ weeks

Alternate 1: Elevator S3 \$ \_\_\_\_\_

Maintenance, Elevator S3 \$ \_\_\_\_\_ monthly

Time to Complete Alternate 1: \_\_\_\_\_ weeks

Alternate 2: Elevator OP4 \$ \_\_\_\_\_

Maintenance, Elevator OP4 \$ \_\_\_\_\_ monthly

Time to Complete Alternate 2: \_\_\_\_\_ weeks

Signature: \_\_\_\_\_

Name (printed): \_\_\_\_\_

Date: \_\_\_\_\_

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ELEVATOR UPGRADES PROJECT  
REV5 - 2007

HOLYOKE SOLDIERS' HOME  
HOLYOKE, MA

## ELEVATOR MAINTENANCE

### **PART 1**

#### **1.1 MAINTENANCE CONTRACT**

- A. Submit a separate monthly price for full maintenance of two passenger elevators P1 and P2, in accordance with the maintenance procedures set out in this specification for a five year period.
- B. Alternate 1: Submit a separate monthly price for full maintenance of one service elevator, S3, in accordance with the maintenance procedures set out in this specification for a five year period.
- C. Alternate 2: Submit a separate monthly price for full maintenance of one passenger elevator, OP4, in accordance with the maintenance procedures set out in this specification for a five year period.
- D. The maintenance price will be reduced by the pro-rata price of those elevators that are out of service during modernization.
- E. The price for the five year maintenance period will be subject to yearly escalation.
  - 1. State the labor and material rates used, the indices upon which they are based, the percentages of the contract escalated by these rates, and the date at which these base rates apply.
  - 2. The owner may, at his discretion, exercise the option of accepting this price at any time prior to the end of the maintenance period included in the purchase and installation contract.
  - 3. At the end of five years the owner shall have the right to renew the contract for a period of five additional years. All terms and conditions will be the same as agreed to in this contract.

#### **1.2 SCOPE**

##### **A. Work Included:**

- 1. The equipment covered under this specification is as follows:
  - a. Three passenger and one service elevator.

#### **1.3 EQUIPMENT**

##### **A. Manufacturer's parts**

- 1. Use the original manufacturer's parts where at all possible.

2. When the original manufacturers' parts are not available or a better substitute is available submit the alternative part for the approval of the owner.

**B. Parts cabinet**

1. Provide a maintenance parts cabinet in each machine room.
2. Provide a cabinet of steel finished in baked enamel and of a minimum 5.0 cubic foot capacity.

**C. Parts**

1. Keep on the site the following spare parts (where applicable).
  - a. Hall button fixtures: two complete hall button switch assemblies (with call registered light assemblies where provided), and four button heads.
  - b. Car operating panel fixtures: three complete car button switch assemblies (with call registered light assemblies where provided), and four button heads.
  - c. Two car door sheaves.
  - d. Door closers: two complete door closer assemblies.
  - e. Door gibs: two sets of door gibs for car and hall doors.
  - f. Three fuses of each size used in the controllers and in the main line disconnect.
  - g. One complete hall station assembly of each type.
  - h. One complete hall lantern assembly of each type.
  - i. Eight hall door sheaves.
  - j. Door locks: one complete door interlock.
  - k. One position indicators.
  - l. Relays: one complete relay of each type with spare contacts and coils.
  - m. Controller resistors: one complete set of controller resistors.
  - n. One of each of springs, stationary contacts and moving contacts for stepping switches or selectors.
  - o. An adequate supply of cleaning solvent, wipers, general purpose oil, buffer oil and door operator oil.
  - p. One emergency stop switch.

2. Arrange that the following spare parts (where applicable) are readily available from your local office.
  - a. One spare, fully populated circuit board for each type used on the job.
  - b. One complete door operator assembly.
  - c. One complete safety edge assembly.
  - d. One complete roller guide assembly of each size used.
  - e. In addition to the above, keep spares for parts used in quantity on the equipment in the ratio of one spare for every 100 such parts.

**D. Tools**

1. Keep the following tools on site and in good working order.
  - a. One blower.
  - b. One dozen contact cleaners.
  - c. Two sets of contact adjusting tools.
  - d. One door pressure gauge.
  - e. One grease gun.
  - f. Twenty-four 3-foot long jumper leads.
  - g. One rechargeable fluorescent portable light.
  - h. Signs stating "REGULAR MAINTENANCE BEING PERFORMED".
  - i. One soldering iron and 22 gauge resin core solder.
  - j. One step ladder.
  - k. Two telephone headsets.
  - l. One vacuum cleaner.
2. Arrange that the following tools are readily available, in good working order, from your local office.
  - a. Twelve cable pullers.
  - b. Two chain blocks or lift pulls.

- c. One dial gauge (with magnetic base).
- d. Two sets of feeler gauges.
- e. One FET volt-ohm-milliammeter.
- f. One dual channel oscilloscope.
- g. One paging unit for each maintenance mechanic.
- h. Four wire rope slings.
- i. One stop watch.
- j. One tachometer.
- k. Three thousand pounds of test weights and a dolly.

#### 1.4 EXECUTION

##### A. Purpose

- 1. The purpose of the maintenance program is to prolong the life of the equipment, to secure the owner's equity and to provide trouble free operation.
- 2. Keep the equipment in substantially "as modernized" condition, or maintain the performance of the equipment as set out herein.

##### B. Minimum standard

- 1. Perform to these specifications as a minimum standard.
- 2. Ensure full compliance with ANSI A17.1 Part XII as applicable.

##### C. Preventive maintenance

- 1. Regularly examine, clean, lubricate and adjust the vertical transportation equipment in accordance with the terms of this specification including the performance levels, procedures and schedules set out herein.

##### D. Responsibility

- 1. Repair or replace, as and when required:
  - a. Machines, rotating electrical equipment, controller parts and electronics, gears, bearings, brake coils, brake linings, door operating equipment, hoist ropes, wiring, motors, and all other mechanical and electrical parts required for the operation of the equipment.
- 2. Do not repair or replace:

- a. Car enclosures, elevator hand rails, floor coverings, hoistway enclosure, hoistway door and frame finishes, door sills or parts damaged by the malicious action of others.

**E. Minimum monthly labor requirement**

1. Provide a maintenance man on site to perform preventive maintenance for a minimum of 2 hours per elevator per month.

**F. Regular hours of work**

1. Regular hours of work are from 8:00 am to 5:00 PM Monday through Friday.

**G. Regular call-back service**

1. Provide twenty-four hour answering service.
2. Provide twenty-four hour call back service for the elevators.
3. Respond only to calls placed by the owner's approved representative except in the case of emergency calls (e.g. someone trapped in an elevator). At the time the call is placed the representative of the owner will indicate if they wish the call to be handled other than during regular hours. Unless otherwise specified all calls (except emergency calls) must be executed during regular hours.
4. Provide regular call-back response within two hours from the time call is placed until the arrival of a maintenance person at the site.
5. Ensure that calls received by an answering service are transmitted immediately to a responsible member of your staff for action.

**H. Emergency call-back service**

1. Arrange that staff are available so that the response to an emergency call-back is within forty-five minutes from the time the call is placed until the arrival of a maintenance person at the site.

**I. Existing conditions**

1. If, prior to, or during the course of carrying out the work, items are discovered which are unsafe, or which may cause unsatisfactory operation following the completion of the work being done under the contract, bring such matters to the attention of the Owner without delay.

**J. Regular checks, examinations and duties**

1. Perform the following duties at least once every month:
  - a. Ride elevator and carefully check for:

- (i) Changes in leveling operation,
  - (ii) Unusual noises,
  - (iii) Changes in door operation,
  - (iv) Proper operation of door protective devices, emergency stop switch, alarm bell, door open button.
- b. Check controller relays, selector or stepping relay contacts and moving parts.
  - c. Check operation of machine.
  - d. Clean machine and machine room floor.
  - e. Check car door rollers and eccentrics.
  - f. Lubricate and clean car door tracks.
  - g. Check car door clutch assembly and clean.
  - h. Check door protective device and fastenings for operation and tightness.
  - i. Check position indicators and signal lamps.
  - j. Check operation of Fireman's service phase I and II.
2. Perform the following duties at least once every three months:
- a. Clean the controller with blower and vacuum and inspect each relay for wear.
  - b. Check all protective circuits and devices on controller.
  - c. Check resistors for indications of overheating and if overheating is found, locate and correct the problem.
  - d. Check operation of hoistway doors and adjust where necessary.
  - e. Check door interlocks, door guides, door hanger wheels and door close cables.
  - f. Inspect and check for proper operation of the limit stopping devices.
  - g. Check roller guides.
  - h. Check the car emergency lighting.
3. Perform the following duties at least once every year:
- a. Vacuum hoistways from top to bottom.

- b. Check operation of overloads and adjust, if necessary.
  - c. Check car operating stations
  - d. Check door operator, clean and lubricate pivot points.
  - e. Check all hall buttons and their connections.
  - f. Check traveling cables for wear.
  - g. Perform a safety test. Forward to the owner, a declaration certifying the successful completion of the test.
  - h. Perform a performance test, measuring car speed, performance times and door times. Forward to the owner, a declaration certifying the times and speeds measured.
4. Perform the following duties at least once every two years:
- a. Re-adjust the equipment for proper slowdown, acceleration and stopping operations.
  - b. Check hangers and junction box connections.
  - c. Check guide rail fastenings.
  - d. Clean and paint machine room floor.

**K. Building log**

- 1. Provide a maintenance log in a permanently bound journal having pre-numbered pages.
- 2. Indicate in the journal the following information: date, time, name of maintenance man, regular maintenance, regular time callback, over time callback, action taken, work completed, and further repairs required.
- 3. The journal is the property of the owner.
- 4. Maintain the journal current, on the premises, and available for inspection by the owner at any time.
- 5. Make all entries in ink, legibly, consecutively and without blanks.
- 6. The owner will not be obligated to pay for work performed by the Contractor where the Contractor has failed to provide the necessary information in the log book.

**L. Coordination with owner**

1. At the beginning of each day contact the building manager's office to receive all trouble calls that may have occurred during the maintenance mechanics absence.
2. Take immediate action on all problems.
3. Immediately following the completion of any corrective action, contact the building manager's office and report the nature of the problem, the corrective steps taken and the time when the elevator was returned to service.
4. Should a problem be of a nature that cannot be satisfactorily resolved during that visit, report back to the owner's representative explaining why it was not possible to correct the problem and when the problem will be resolved.

**M. Time tickets**

1. Show on each regular maintenance time ticket the division of work and detail the portion of that division completed.
2. Submit time tickets for each call-back detailing exactly the cause and the action taken.

**N. Repairs**

1. Advise the owner at least two weeks prior to scheduled repair work, outside of the regular maintenance procedure.
2. Advise the owner immediately, of any non-scheduled repair work requiring equipment to be removed from service.
3. In all cases communicate the status of repairs to the owner at the beginning and close of the normal working day.
4. In the case of all repairs, advise and discuss with the owner the merits of continuing in overtime to completion of the repair, and proceed with such overtime work when authorized in writing by the owner.
5. Where possible indicate the time required for completion of repairs.

**O. Safety devices**

1. At no time permit the equipment to operate while any of the safety devices, mechanical or electrical are inoperative.

**P. Safety inspections**

1. Carry out all instructions of the inspecting authorities within 30 days of notice of deficiency except for those items that are the responsibility of the owner and directives

resulting from changes to the existing codes.

**Q. Assistance for inspections**

1. Provide all necessary co-operation, tools, test equipment and assistance to allow inspections of the equipment. (Routine inspections - every 6 months; periodic inspection - every year and five year tests)
2. Provide an adequate number of knowledgeable and qualified personnel to perform the above inspections and tests in accordance with ANSI A17.1 (2004), A17.2 (2008) and A17.3 (2008) at no additional cost to the owner.

**1.5 EQUIPMENT PERFORMANCE**

**A. Operating time**

1. Maintain the passenger equipment so that the elapsed time to travel one typical floor does not exceed 10.0 seconds.
2. Measure this time under the following conditions:
  - a. A typical floor shall not exceed 10 feet.
  - b. Floor level is considered to be within 0.25" of level.
  - c. 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.
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 code requirements.
5. Adjust the equipment so that for other conditions of loading, the time does not vary more than five percent.
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 so that this operating time can be readily maintained over the life of the elevator installation.
7. Maintain 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.

**B. Speed control**

1. Maintain the equipment and control so that an average acceleration over the total accelerating period is not less than 3.0 FPSPS and acceleration peaks do not exceed 4.0 FPSPS.
2. Maintain the equipment speed at the contract speed plus or minus five percent.

**C. Leveling**

1. Maintain all cars to stop automatically at floor level, without overshoot, regardless of load or direction of travel so that the car sill is within 0.25" level with respect to the hoistway sill.