

ELEVATOR MODERNIZATION SPECIFICATION

1.01 SCOPE OF WORK

- A. Furnish all engineering, materials, labor, tools, equipment, transportation, supervision, testing and inspections to modernize Three (3) passenger elevators as specified herein. In addition, perform full coverage preventive maintenance service commencing upon Notice to Proceed and continuing through the warranty/guarantee period.
- B. In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.
- C. Any items not specified in detail by the Contract/Specification but which are incidental to or necessary for the complete installation and proper operation of the work described herein or reasonably implied, shall be furnished as if called for in detail by the Contract/Specification.
- D. Bidders must report discrepancies or ambiguities occurring in the Contract/Specification prior to the submission of the bid proposal. Submission of the bid without clarification will reflect acceptance of the Contract/Specification as written.

1.02 CONSULTANT'S RESPONSIBILITIES

- A. Owner has hired a Consultant who shall act as a representative of Owner in matters pertaining to the work of the contract, including interpretation of Contract/Specifications and contract documents, review of shop drawing submissions, approval of payment applications, review of project progress, and final review of the completed work prior to acceptance by Owner.

1.03 STANDARDS AND REGULATIONS

- A. All material, design, clearances, construction, workmanship, operation and tests shall be in accordance with the requirements of the most recent issues of the ANSI A17.1 Safety Code for Elevators and applicable state or local codes including City of Las Vegas, State of Nevada, Clark County, the National Electrical Code, the BOCA Code, the National Building Code, the NFPA Code, the Americans with Disabilities Act and all other Codes, regulations, laws, and ordinances as may govern. Where conflicts occur in the above codes, the most rigid shall apply.
- B. Nothing contained in this Contract/Specification shall conflict with any codes or federal, state or local laws, ordinances, rules or regulations governing the work.

1.04 PERMITS AND INSPECTIONS

- A. Contractor shall give all requisite notices, obtain and pay for all permits, and pay all deposits and fees necessary for the installation of all work provided under this Contract/ Specification. In addition, Contractor shall obtain and pay for all necessary state and local inspections and conduct such tests as may be required by the regulations of such authorities. These tests shall be made in the presence of the authorized representative of such authorities and in the presence of Owner. An elevator installation permit shall be displayed on the job site and visible to interested parties.

- B. The installation, when complete, shall receive the final approval of all constituted authorities and Contractor shall submit evidence of the inspection results and the Certificate of Operation from the constituted authority.

1.05 CONTRACTOR QUALIFICATION

- A. Contractor shall be one regularly engaged in the business of design, engineering, manufacture, installation, modernization, and/or servicing of elevators of the type and character required by this Contract/Specification, shall be or represent an approved manufacturer, and shall assume full responsibility for the products used in assembling the elevator equipment. Certified engineering drawings and descriptive technical data on the proposed equipment shall be provided by Contractor as furnished by the component manufacturer.
- B. Contractor shall show successful experience in the complete installation, modernization, and maintenance of elevators, that it employs competent personnel trained in the installation, modernization, and maintenance of the equipment required in this Contract/Specification, that it maintains locally an adequate stock of parts for replacement or emergency, and that it has qualified employees locally available to ensure the fulfillment of the service without unreasonable delay. This maintenance service shall be performed solely by Contractor and shall not be assigned or transferred to any agent or subcontractor.

1.06 SHOP DRAWINGS/SUBMITTALS AS BUILT DRAWINGS

- A. Job specific shop drawings and technical coordination information shall be submitted for review prior to commencing with fabrication of the equipment. The first shop drawing submittal shall be complete. Partial shop drawings will not be reviewed until they are complete. Delay in the project as a result of partial submittals shall be the responsibility of Contractor. Shop drawing submission shall include, but not be limited to, the following:
 - 1. Hoistway and machine room layouts, if required.
 - 2. Hoistway entrance, sill, header, and door equipment layout, if required.
 - 3. Elevator Cab layout, if required.
 - 4. Signal Operating Fixture Details.
 - 5. Electrical coordination information. (Cab light disconnect, machine room light and receptacle, main line disconnect, hoistway/pit lights and receptacles)
 - 6. Structural calculations for new machinery and equipment as required by code.
- B. Upon completion of the project, Contractor shall submit the following:
 - 1. One (1) set of diagnostic tools, including all manuals, codes and sundries necessary to operate the tools to test, adjust and maintain the elevator equipment provided. The tool shall become the property of Owner.
 - 2. Three (3) sets of complete certified engineering data, including parts lists and parts numbers on all equipment as will be necessary for maintaining the equipment and for ordering replacements. Certified engineering data shall be permanently bound.
 - 3. One (1) original reproducible and three (3) complete and legible sets of blue or black line wiring diagrams and straight line diagrams showing the complete electrical connections, functions and sequence of operation of all apparatus connected with the elevator, including door operator, both in the machine room and in the hoistway, together with

photographs or cuts of controller repair parts with numbers listed. Each device on the wiring diagrams and controller panels shall be properly and permanently identified by name and part number.

4. One (1) original reproducible and three (3) complete sets of As-Built shop drawings, including layouts and signal operating fixture details.
5. Three (3) complete parts catalogs listing all replacement parts and numbers for all equipment installed and the names of the equipment suppliers and reordering procedures. Parts catalogs to be bound in permanent binders.
6. Three (3) sets of neatly bound instructions explaining all operating features including apparatus in the car and lobby control panels, control sequence of operation, adjusting and troubleshooting procedures.
7. Three (3) sets of lubrication charts indicating lubrication points and type of lubrication recommended for all equipment. One (1) set shall be bound and permanently maintained in the elevator machine room.
8. Ten (10) sets of keys to operate all key operated functions all marked and identified.

1.07 MATERIALS & EQUIPMENT

- A. All materials and equipment to be furnished under this Contract/Specification shall be new, of the best grade and quality used for the purpose of commercial practice and shall be the latest standard product as advertised in printed catalogs by reputable manufacturers. All equipment or apparatus of any one system must be the product of one manufacturer, or equivalent products of a number of manufacturers which are suitable for use in a unified or assembled system. All parts of the elevator equipment shall be built to standard dimensions, tolerances and clearances in order to ensure complete interchangeability of similar parts of similar machines and devices.

1.08 HOISTING, HANDLING AND INSTALLATION OF EQUIPMENT

- A. Contractor shall provide for all cartage, handling and receiving, hoisting and lowering and removal of equipment related to the work, from the property. Contractor shall be responsible for all permits, fees and coordination with local authorities, including local police and fire departments, for use of crane service on and around the property.
- B. The equipment shall be installed in accordance with the equipment manufacturer's direction, referenced codes and Contract/Specifications.
- C. The machine room equipment shall be installed with clearances complying with referenced and applicable codes and Contract/Specifications.
- D. All items shall be installed so that they are safely accessible for maintenance and so that they may be removable via portable hoist or other means for maintenance and repair.

1.09 ACCEPTANCE OF EQUIPMENT

- A. No approval, either written or verbal, of any drawings, descriptive data or samples of such material, equipment and/or appurtenances shall relieve Contractor of his responsibility to turn over the same to Owner in perfect working order at the completion of the work. Any material,

equipment, or appurtenances, the operation, capacity or performance of which does not comply with the Contract/Specification requirements, or which is damaged prior to acceptance by Owner, shall be held to be defective material and shall be removed and replaced with proper and acceptable materials, equipment and/or appurtenances, or put in proper and acceptable working order, satisfactory to Owner, without additional cost Owner.

1.10 SPECIAL TOOLS AND INSTRUCTIONS FOR USE

- A. Contractor shall provide all required specialized tools, instructions for their use and sundries as necessary to perform diagnostic evaluations, adjustments and/or programmable software changes on any unit of the microprocessor based elevator control equipment provided. Diagnostic tools shall become the property of Owner.
- B. Diagnostic tools which require periodic recalibration and/or re-initiation shall be performed by Contractor at no cost to Owner for a period of ten (10) years from the date of final acceptance of the equipment, regardless of whether Contractor is or is not the maintenance contractor for the equipment. Should a diagnostic tool be required to be repaired, recalibrated or reinitiated, Contractor shall provide a similar "loaner" tool to Owner, until the original Owner's tool is returned.
- C. Diagnostic tools provided to Owner shall be capable of performing all levels of diagnostics, systems adjustments and software program changes that are available to Contractor.
- D. Contractor shall provide three (3) bound sets of printed instructions for use of any tool that may be necessary to perform diagnostic evaluations, systems adjustment and / or programmable software changes on any unit of the microprocessor based elevator control equipment. Contractor shall provide access codes, passwords and other proprietary information that is necessary to interface with the microprocessor control equipment. In addition, Contractor shall provide step by step adjusting, programming and troubleshooting procedures as pertain to the microprocessor control equipment, a composite listing of the individual settings chosen for the variable software parameters stored on the software programs of both motion and dispatch controllers.

1.11 RELATED WORK INCLUDED AND PART OF THE ELEVATOR CONTRACT

- A. Contractor shall submit its proposal based on acceptance of the hoistways and machine room as exists. Contractor shall notify Owner of any changes to the hoistways and/or machine room, which are necessary to accommodate Contractor's equipment or to comply with Code prior to the submission of the bid for the elevator modernization.
- B. Contractor shall assist Owner with coordination and completion of the work to be performed which is part of the Elevator Contract, as required, during the course of the project to assure that all work required of other trades is completed in such a manner and in such time as will be required to permit Contractor to commence and complete the Contract work within the project schedule requirements.
- C. The following Electrical/Mechanical work is included in Contractors scope of work:
 - 1. Replace existing main line disconnects in the machine room. Contractor shall be responsible for designing new elevator equipment to work with existing electrical feeders and new main line disconnects.

2. Furnish and install new separate 110 volt lockable disconnects for cab lighting. One per elevator.
3. Re-use wiring to the elevator machine room for telephone communication or provide new as needed. Provide a consolidator so at least two cars can be on one phone line.
4. The smoke detector at the main lobby floor shall be programmed so that when activated the elevators will go the alternate recall floor. When any of the other smoke detectors are activated the elevators shall recall to the main floor. Reconnection of the existing system by Contractor.
5. Provide necessary modifications to the existing fire alarm system so that all items in #4 above are properly interfaced with the existing fire life safety system.
6. Contractor to reuse existing grounding if acceptable or to run wiring for True earth ground from elevator machine room to main building ground if necessary.
7. Provide new outlets in the pits and machine room with GFCI protection.
8. Provide power source and disconnect for new intercom.
9. Provide additional lighting in machine room and pit; make any necessary repairs to the existing machine room lights. Provide protective grill/covers on the machine room and pit lights.
10. In each elevator pit, install a pit ladder, light switch, and one (1) double 48 inch T8 fluorescent light fixture.
11. If required, provide all materials and labor to construct a new Fire Command Center and panel. Location to be established by City/County Fire Department and the Building Owner.

1.12 DEMOLITION, CUTTING, ALTERATIONS AND REMOVALS

- A. All demolition, cutting, alterations and removal required to prepare the building to receive the new work, and any such demolition, cutting, alterations and removal which may be necessary to complete the work in a first class workmanlike manner, shall be performed by Contractor.
- B. All surfaces, such as roofs, walls, windows, floorings, ceiling, etc., which are damaged or disturbed due to the performance of the work of this contract, shall be repaired by Contractor in a first-class workmanlike manner to match existing and surrounding areas.
- C. All permanent and temporary bracing and anchoring required for the support or transfer of any load while demolition or installation work is in progress shall be provided by Contractor. All work shall be made absolutely stable and secure and Contractor shall be held strictly responsible for any damage resulting from failure to properly furnish such support.
- D. Contractor shall protect Owner's property, equipment and stored materials against damage, dust and dirt at all times and shall confine all methods of construction to promote safety and reduce noise and dust, due to occupancy of the property and provide necessary protective guards, barricades, tarpaulins and drop cloths.

- E. Contractor shall remove all unused and demolished equipment and rubbish on a continual basis and shall keep the premises clean at all times during the term of the project. At the completion of work, Contractor shall leave the premises clean and in such condition as is satisfactory to Owner.

1.13 MATERIAL AND EQUIPMENT DELIVERY, STORAGE

- A. All materials shall be delivered in the original unopened protective packaging and shall be stored in the protective packaging to prevent soiling, physical damage and wetting.
- B. Equipment and exposed finishes shall be protected during transportation, erection and construction against damage and stains.
- C. Contractor shall confine his apparatus and the storage of materials to limits established by law, ordinances, permits or directions of Owner and shall not unreasonably encumber the premises with his materials. All flammable or combustible materials shall be properly stored to eliminate potential fire hazards.

1.14 PROJECT MANAGEMENT AND SUPERVISION

- A. Contractor shall designate an experienced Project Manager to perform the administrative management of the project and place a competent Superintendent in charge of the project throughout the course of the work. Contractor's on-site job Foreman shall be responsible for day-to-day operations and scheduling with Owner. The Project Manager and Superintendent shall be available to Owner to assist in the progress and coordination of the work of the project and shall represent Contractor in all matters relating to the project.

1.15 SAFETY PLAN

- A. Contractor shall submit a detailed safety plan for this project at time of shop drawing submittal. Safety Plan shall detail the type and construction of the barricades to be used at open hoistways, rigging to be worn by Contractors, and first aide kit. The superintendent shall hold a safety meeting on site monthly.

1.16 EXECUTION

- A. Contractor shall perform the following as part of the execution of the work of the Elevator Contract:
 - 1. Comply with all requirements of the local Fire Codes that are applicable to this work.
 - 2. Be sensitive to the needs and entitlements of the occupants of the building while performing the work.
 - 3. Confirm that the Contract/Specification and contract documents are complete with regard to the work required to provide for a complete, legal and Code compliant installation.
 - 4. Confirm that the elevator equipment to be provided will fit within the space available. Survey the job site and verify by measurement all dimensions affecting the work to be performed as part of the Contract. Advise Owner of any deficiencies which may be in

- conflict with design tolerances of the equipment to be installed, prior to fabrication of the equipment affected.
5. Provide information as required for coordination of work to be performed by other trades which will affect scheduling of the elevator work and information required for coordination in scheduling the elevator work which will affect the scheduling of other trade contractor work.
 6. Permit only skilled workmen to perform the work of the Elevator Contract.
 7. Install all equipment in accordance with the Elevator Contract, the Contract/Specification and the final approved shop drawings,
 8. Comply with all applicable Codes, manufacturer's instructions and installation procedures.
 12. Keep all means of access and egress to and from the building, stairwells and lobbies free and clear of materials, tools and equipment at all times.
 10. Broom sweep the work areas, remove all hazardous materials from the site on a daily basis and keep all areas clean of all dirt and grease resulting from the work.
 11. Protect all finished surfaces during installation through to the final acceptance of the elevators. Upon acceptance of the elevators, remove all protective coverings and thoroughly clean finished surfaces of paint, wrappings, mastic, etc. Repair any damage, including scratches, dents, discoloration, etc. which may have occurred to the finished surfaces with the exception of any obvious vandalism, misuse or abuse of the equipment by others.

1.17 LIFE SAFETY SYSTEMS

- A. Contractor shall maintain all operating life safety systems in operation at all times, including elevator Fire/Emergency recall and operation and Emergency Power operation. Elevators operating for the Workman's or Public's use are to be Code compliant at all times throughout the work of the Contract.

1.18 TESTING

- A. Upon completion of each elevator and of each system, Contractor shall completely test the equipment, both before the local authority and Owner, to demonstrate that the equipment was provided in accordance with Code and Contract/Specification requirements and complies with the Performance criteria listed elsewhere in the Contract/Specification.
- B. Contractor shall provide all labor, tools and equipment necessary for on-site observations, testing, retesting, inspections and re-inspections as may be required to satisfy the Code testing requirements, the requirements of the local testing authority and the requirements of Owner.
- C. Upon satisfactory completion of required tests, Contractor shall obtain and submit to Owner the Certificate of Operation or other instrument, which may be required to legally permit Owner to operate the elevator.

1.19 FINAL CLEAN-UP

- A. Upon completion of the project, Contractor shall clean out and remove all loose materials from the hoistway, pit and machine room; remove all crating and packing materials and all unused elevator equipment from the job site; clean the machine room floor of dirt, oil, grease and dust and paint the machine room floor, pit and car top to provide for the machine room pit and car top to be dust free at the time of the Final Acceptance of the elevator system.

1.20 INSTRUCTIONS TO OWNER

- A. Contractor shall provide a minimum of four (4) hours of instructions to Owner's personnel upon completion of the elevator installation. Instructions shall include safety procedures, proper operation of all equipment and routine maintenance procedures. In addition, Contractor shall provide explanation and demonstration of each control feature and operation, including Independent Service Operation, Emergency Recall Operation, Phase I and Emergency in Car Operation Phase II, Car to Lobby, Swing Car Operation, and Emergency Power Operation.

1.21 WARRANTY AND GUARANTEE

- A. Contractor shall warrant and guarantee all equipment provided and installed under this Contract/Specification against defects in materials and workmanship and will correct any defects not due to ordinary wear and tear or improper use or care which may develop within one (1) year from the date the last elevator is completed, placed into operation and accepted by Owner. This warranty is not intended to supplement normal maintenance service and shall not be construed to mean that Contractor shall provide free service or periodic examination, lubrication, or adjustment due to normal use, beyond that included in the Contract/Specifications, nor shall Contractor correct, without charge, breakage, maladjustments, or other trouble arising from abuse, misuse, improper or inadequate maintenance, or any other causes beyond his control.

1.22 MAINTENANCE SERVICE

- A. **Interim Maintenance:** Contractor shall provide a lump sum price in the Bid Form to provide full coverage maintenance service to *Three (3) passenger elevators* commencing upon Notice to Proceed for the modernization contract work. This interim maintenance service shall provide comprehensive full coverage maintenance, as outlined in the attached maintenance specification, on the existing elevator equipment and on each modernized elevator as they are placed back into operation including emergency callback service and shall be made available on a 24-hour 7 day per week basis, upon Owner's request. The service shall continue through until the completion of the modernization contract work and acceptance of the last elevator by Owner. The amount of this lump sum price shall be paid monthly over the schedule provided in the contract documents. Should Contractor finish the project in less time then allotted by the schedule, Contractor will be paid for the remaining lump sum amount. Should Contractor go beyond the contract schedule, Contractor will continue to provide full maintenance coverage at no cost to owner.
- B. **Warranty Maintenance:** Once the elevator modernization work has been completed and accepted as substantially complete by Owner and Elevator Consultant the Elevator Contractor shall provide warranty maintenance for 12 months. The Warranty Maintenance shall be all-inclusive and not include any pro-rations or exclusions and shall provide comprehensive full coverage as outlined in the attached maintenance agreement. The price for this service shall be stated as a lump sum on the Bid Form. The amount of this lump sum price shall be paid monthly over the 12-month period.

- C. The preventive maintenance program service to be provided shall consist of twice per month examinations of the equipment, adjustments, lubrication, cleaning, supplies and parts to keep the equipment in proper operation, except such adjustments, parts or repairs made necessary by abuse, misuse or any other causes beyond the control of Contractor. Contractor shall also repair or replace existing retained electrical and mechanical parts of the elevator equipment, whenever this is required, and shall use only genuine standard parts produced by the Manufacturer of the equipment concerned. All wire ropes shall be replaced as often as necessary to maintain an adequate factor of safety. Full load safety tests and Code required testing of the elevators and elevator operation shall be included as part of the contract, as well as provisions for termination of the Maintenance Contract for non-performance.
- D. All maintenance service work shall be performed solely by Contractor and shall not be assigned or transferred to any agent or subcontractor. The work shall be performed by competent personnel under the supervision and in the direct employ of Contractor.
- E. Prior to removing an elevator from service and subsequent to completion of the elevator modernization work, preventive maintenance and callback service work shall be performed during the regular working hours of the regular working days of Contractor, unless specifically requested to be performed at other times by Owner. In that case, Contractor shall be compensated for the difference paid the elevator examiner between straight time rates and the applicable overtime rates for the time spent performing the requested work, but excluding travel time. Emergency callback service shall be made available on a 24 hour 7 day per week basis and be available upon Owner's request.
- F. During the time period when one of the elevators has been removed from service to perform the modernization work, maintenance service work on the other elevators which shall require removal of an elevator from operation shall only be permitted during the time period of 6:00 am to 8:00 am, after 5:00 pm, or on the weekends.

1.23 CONTINUING SUPPORT

- A. Should Contractor's contract for continuing maintenance services not be executed by Owner, or should it be canceled for any reason by either Owner or Contractor, Contractor shall be obligated to notify Owner and to provide to Owner continuing information regarding changes recommended or necessary to be performed to the equipment to comply with Code changes or Manufacturer recommended and/or authorized changes or repairs, modifications, adjustments, replacements, etc., to permit for the continued integrity and safe/reliable operation of the equipment provided under the elevator installation contract and this Contract/Specification. In addition, Contractor shall provide field and technical assistance and instructions to Owner or Owner's elevator maintenance company, upon Owner's request, within a reasonable time following Owner's request, for which Contractor shall be compensated at Contractor's direct cost plus a reasonable charge for profit and overhead for materials and labor. Labor charges shall not exceed Contractor's standard elevator mechanic hourly billing rates. Contractor shall also be obligated to perform any repairs and/or replacements of equipment components required by the component Manufacturer to be made to correct faulty design or manufacture.

2.01 ELEVATOR SCHEDULE/EQUIPMENT SUMMARY⁽¹⁾

2040 West Charleston	Existing	After Modernization
Description:		
Quantity (Elevators)	3	3
Speed	350 FPM	350 FPM
Capacity	2500 lbs.	2500 lbs.
Stops/Opening	Cars 10 –11 (6 in line) 12 (7 in line)	Cars 10 –11 (6 in line) 1, 2, 3, 4, 5, 6. Car 12 (7 in line) 1,2,3,4,5,6,7.
Travel:		Contractor to verify
Operation	Armor	Microprocessor (3) Car Group
Machine Room:		
Machine	Armor	Retain existing – Replace defective bearings and seals
Hoist Ropes	4 - 5/8"	Retain existing
Rope Gripper	None	Provide new in accordance with A17.1 2007
Controller	Relay Logic/Solid State	Provide new microprocessor controllers. (A17.1 2007)
Power Conversion	Motor Generator Set	New Variable Voltage Variable Frequency Drive
Governors	Armor	Replace with Hollister Whitney
Deflector Sheave		Retain existing. Replace worn beatings.
Hoistway:		
Hoistway door equipment	GAL (Center Opening)	Recondition to "like new" the existing tracks, interlocks, closers, and door gibs. Replace door and pick up rollers. Retain existing door panels. See special handling.
Hoistway Door Panels		
Hoistway limit switches		Provide all new. TLS Slowdown
Car & Cwt Rails		Realign as needed for smooth/quiet ride.
Wiring/Duct		Provide all new wiring and duct.
Cwt roller guides	GAL	Replace with Elsco Type C
Car:		
Car-top-control		Provide all new.
Car roller guides	GAL	Replace with Elsco Type B.
Door Operator	GAL	Provide new closed loop door operators. GAL MOVFR
Car Door Equipment		Retain the existing Car Door Panels. Install new GAL MOVFR car door operator, tracks, hanger rollers, headers, clutch, and gate switch.
Safety Edge	Electric Edge cars 11-12	Provide new Janus "Panachrome" 3D or approved equal.
Top of Car Railing	None	Provide per current code
Pit:		
Stop Switch		Provide new in compliance with code.
Buffers	Hollister-Whitney	Refurbish as needed. Clean and paint.
Signal Fixtures		
Car Operating Panel	Main	Provide new Main A 17.1 2007 compliant
Hall PB Station		Provide new Hall Pushbutton fixtures at each floor.
Hall Lanterns		Provide new electronic chimes and LED illumination. Retain the existing faceplates. Remove existng up/down car riding lanterns and cover with #4 stainless plate.
Hoistway Access Sws.	None	Provide Top and Bottom Hoistway Access per code
Fire Command Center		Provide all new Fire Command Panel w/ digital PI's and key switches (FS, EP, Car to Lobby) if required
Intercom Communications Device	None	Provide new intercom communication device in each car, elevator machine room, and Fire Command Center.

(1) Summary is just a brief outline to give general scope of work. If a discrepancy exists between the summary and body of the technical specifications, or if an item is not included in the summary, the body of the technical specifications will take precedence.

2.02 ELEVATOR CONTROL SYSTEM (VVVF DRIVE)

- A. The existing Armor elevator control system shall be removed and a new three (3) car group microprocessor control system installed. Remove the existing Motor Generator Sets and install new Variable Voltage Variable Frequency Drives. (VVVF Drives)
- B. A position selector shall provide positive means of determining the position of the elevator in the hoistway at all times. Digital encoders shall be provided on the elevator or in the machine room. **Analog systems utilizing perforated steel tapes are not permitted.** The encoder unit mounted on the top of the car or on the governor shall be capable of providing a signal as to the position of the car in the hoistway. Floor location for leveling shall be determined via magnetic strips affixed to the brackets or tapes to define the floor-leveling zone. The position selector shall provide 1/8" resolution accuracy for the entire length of the hoistway.
- C. A digital velocity transducer shall be mounted on the machine to communicate the machine speed to the individual car computer. **Analog systems utilizing Tachometers are not permitted.** The car computer shall continuously compare the machine speed to the optimum velocity profile and point of slowdown for the target floor and control the acceleration and retardation to final stop regardless of travel or load in the car. Adjustments to the pattern shall be performed to the elevator prior to committing the selected ride pattern to the car computer's memory. Data shall be stored in a non-volatile memory in the system to prevent malevolent use and be accessible only to authorized technicians. The hoistway position selector device shall provide a visual display of the current shaft count or synchronous position plus a bar graph indication of the pattern profile/elevator speed. Means for adjusting the test speed, pattern precondition, soft start acceleration and deceleration shall be included in the car controller. Battery backup memory shall be provided to retain the current floor count in the event of a power shutdown. Nominal shaft counting errors shall be corrected each time the elevator stops at a floor or terminal landing to reset shaft counts.
- D. The control system shall be designed to automatically bring the car to a floor landing. The stop shall be smooth without any sudden brake application. The floor approach shall be without any hesitation or delay in time. Floor sensing devices shall correct for overtravel and undertravel and shall maintain the car within a maximum of 1/8" of the floor line, regardless of rated capacity, load or direction of travel.
- E. The controllers shall be enclosed in properly ventilated metal cabinets with sides and top, and with hinged access doors on the front and the back. Rubber mats shall be installed on the floor in front and behind each controller, starting panel and selector, as required, for electrical grounding protection of the equipment.
- F. All controller printed circuit boards, discrete components, switches, and other items of control equipment shall be mounted on a common panel or individual panels which shall be made of an approved, moisture-resisting, noncombustible material which shall be securely mounted in a substantial, self-supporting steel frame with fastenings suitable for panel demounting. A vibration absorbing mounting shall be provided for the steel frame, if necessary, to eliminate perceptible vibration.

- G. Electro-mechanical switches and relays shall be used where heavy current is supplied and/or on safety circuits required by the governing Elevator Codes.
- H. Switches shall be of the direct current type, magnet operated with contacts of design and material to insure maximum conductivity, long life and reliable operation without overheating or excessive wear, and provide a wiping action to prevent sticking due to fusion. Switches carrying highly inductive currents shall be provided with arc deflectors or suppressers.
- I. All switches, printed circuit boards and discrete components shall be mounted in the front of panels together with any small electronic components. Large capacity resistors shall be mounted on the rear, sides or top of panels.
- J. Protective devices shall be provided to protect the driving motor of the generator against overload and single phasing in all three phases of the Delta connection, and/or protect the Motor Drive Unit or VVVF Drive against overload and phase reversal.
- K. Time delay circuits shall be of an accepted design that is reliable and consistent, such as electronic timing circuits. No air dash pot relays shall be used.
- L. Wiring on the controller, whether factory or field wiring, shall be done in neat workmanlike order and all connections shall be made to studs and/or terminals by means of grommets, solderless lugs or similar connections. All wiring shall be copper.
- M. Terminal blocks with identifying studs shall be provided on the controller for connection of board wiring or external wiring.
- N. Identifying symbols or letters shall be permanently marked on or adjacent to each device on the controller and the marking shall be identical to marking used on the wiring diagrams. In addition to the identifying marks, the ampere rating shall be marked adjacent to all fuse holders.
- O. All input-output devices shall be marked similarly to relays for easy reference to wiring diagrams.
- P. The selector shall be part of the microprocessor. Position determination in the hoistway may be through fixed tape in the hoistway or by an encoder fitted to the governor. The features and electrical circuits shall be so designed to permit accurate control and rapid acceleration and retardation without discomfort.
- Q. Contractor shall confirm which floor are to be the main dispatch floor, the Fireman Recall floor and the Alternate Fireman Recall floor, prior to fabrication of the control equipment. The control shall be programmable to enable the dispatch and recall floors to be changed in the field.
- R. Contractor shall provide all electrical information necessary for review by Owner or Consultant at the time of submission of the elevator hoistway layout drawings.
- S. Owner and Elevator Consultant will judge riding qualities of cars and enforce the following requirements. Contractor shall make all necessary adjustments.
 - 1. Acceleration and Deceleration: Starting and stopping shall be smooth and comfortable, without obvious steps of acceleration. Slowdown, stopping and leveling

shall be without jars or bumps. Stopping upon operation of emergency stop switch shall be rapid but not violent.

- a. Vertical Acceleration: Maximum 4 ft. (1220 mm) per second squared. Maximum jerk 8 ft. (2440 mm) per second cubed.
 - b. Horizontal Acceleration: Maximum 10 mg peak-to-peak measured at full speed for full travel in both directions.
2. Full Speed Riding: Free from vibration and sway.
 3. Vibration: Sound isolate machines and motor drives from beams and building structure to prevent objectionable noise and vibration transmission to occupied building spaces.
 4. Airborne Noise: Maximum allowed acoustical output level of:
 1. 75 dba measured in machine room.
 2. 60 dba measured in elevator cars during all sequences of operation.
 3. 45 dba measured in elevator lobbies.

2.03 MICROPROCESSOR DISPATCH OPERATION CONTROLLER

- A. A solid-state programmable microprocessor dispatch controller shall be provided. The elevators shall operate without attendants as a group and be capable of balancing service and continuing operation with one or more cars removed from the system.
- B. The microprocessor shall continuously accept external data from passenger registration of hall and car calls and from each elevator indicating present operating condition. Data shall be analyzed and weighed based on elevator operating status, i.e., elevator in or out of service, bypass, at lobby in Next Car mode, direction of travel and position of each elevator, condition of car doors, i.e., open, closed, opening or closing, condition of each elevator, i.e., accelerating, full speed, decelerating, number of stops due to car calls, number of stops due to previously assigned hall calls, coincident car calls, system condition, i.e., Up Peak or Down Peak, and predictive car and hall call assignments. The microprocessor programming shall include velocity / distance formulae to calculate the time it will take for each elevator to respond to newly registered demands and compare response time for each car to the newly registered demand and assign the car which can respond to the demand in the shortest time period. The microprocessor program shall include the ability to continuously monitor elevator and demand status and change assignments when changing conditions warrant.
- C. The elevators shall operate from buttons located at each floor and in each car. Registration of calls by momentary pressure on buttons shall cause the cars to respond to passenger demand. Cars shall slow down and stop automatically at landings corresponding to calls registered on car or hall buttons. These stops shall be made in the natural order of floors for each direction of travel irrespective of the order in which the calls were registered, except that only one car shall stop in response to any particular hall call. The system shall continuously review and modify all hall call assignments to insure that the closest elevator in real time to a hall call is assigned to that call. Simultaneous to the initiation of the slow down of a car for a hall call, that call shall be canceled. The call shall remain canceled and the hall button ineffective until the car

doors begin to close after passenger traffic. Calls registered on car buttons shall cancel in the same manner.

D. The supervisory control system shall operate to meet the changing traffic conditions on the basis of demand. Provisions shall be included for handling traffic as follows:

1. Heavy Up Incoming Traffic Conditions: The control shall automatically recognize heavy incoming traffic in the morning and noon times as well as other times during the day by monitoring the changes in car passenger loads, the number of car calls registered and the frequency of cars departing the lobby. As the incoming traffic intensity increases, the number of cars assigned to the lobby shall increase.

During Heavy Up, cars shall be loaded one at a time and only the doors of the next car shall open. As that car becomes loaded, or the loading time expires, the car shall leave and an adjacent car shall become next. Multiple car loading provisions shall be incorporated into the system to permit multiple Next car assignments. If a car returns to the Lobby with a passenger, causing the doors of that car to open, that car shall be capable of receiving passengers and dispatching within the normal dispatching time as if it were the next car.

A car traveling Up on Heavy Up shall reverse and return to the dispatch floor after it has answered its car calls and any Up hall calls assigned to it. Down hall calls shall be answered by any car on the return trip.

When the incoming traffic diminishes, the control shall reallocate cars from the dispatch floor and permit cars to park with their doors closed at the last floor served.

2. Heavy Down Traffic Conditions: The control shall automatically recognize heavy outgoing or Down traffic conditions by monitoring the number of Down hall calls, their estimated time of arrival and the actual waiting time. During this mode, the Down hall calls shall be given preferential service to handle the exiting traffic. All cars assigned to the main dispatch floor shall be released and cars arriving at the main dispatch floor shall remain at that floor for the same length of time as for any other floor. All Down hall calls shall be assigned based on which car has the best potential arrival time. The Down Peak traffic mode shall have priority over Up peak.
3. Selectable Hall Waiting Time, Down Peak: The Up hall call response time shall be preset so that Up calls can be answered in an adjustable minimum/maximum time interval, permitting better service to the outgoing traffic. The assignments shall be made the same way as under Selectable Hall Waiting Time, Up Peak, but for Up hall calls only.
4. Intermittent or Light Traffic: The control shall automatically keep the required number of cars in service based on the forecast waiting time. Cars shall remain parked at the last floor served.
5. Lobby Terminal Demand: The control shall provide for an adjustable number of cars at the dispatch floor during off peak conditions. When there is no next car at the dispatch floor, the estimated time of arrival of the down traveling cars is calculated. If no car can reach the dispatch floor within an adjustable time, a dispatch floor demand shall automatically return an available car.

6. Coincident Calls: The control shall give priority in assignment of a hall call to a car with a corresponding car call. If this coincident hall call cannot be answered within the adjustable priority time, the car with the best potential arrival time shall be assigned to the hall call.
7. High Priority Floor: A priority floor shall be a floor which is to be served within a preset adjustable time. If the car with the best estimated time of arrival exceeds the preset time, the control shall assign the priority call to the best car, removing all hall call assignments from that car, taking into consideration only car call stops. The assignment of a floor as a High Priority floor shall be field adjustable.
8. Fail Safe Dispatching Operation: Should the car selection or dispatching system fail, so that cars are not dispatched within the predetermined interval and in accordance with the conditions of the operating pattern in effect, the cars shall leave the dispatching terminals without regard to sequence of regular intervals and proceed to answer registered calls in the normal sequence and manner, unless fire return features have been activated, until dispatching malfunctions are corrected and normal service is restored. Optional power provisions shall be incorporated into the elevator control dispatch system to prevent loss of control memory, sequence of operation and/or other control functions due to fractional power interruptions, spikes or other interferences.
9. Delayed Car: A car delayed for a predetermined time shall be automatically disconnected from the system operation. When the delay is corrected, the car shall be reconnected into the system.
10. Door Dwell Times: Door dwell times shall be field adjustable with resolution to 0.1 seconds. The dwell time at the main dispatch floor shall be adjustable between 3 and 15 seconds. The dwell time for a car call stop at a typical floor shall be adjustable between 1 and 8 seconds and the dwell time for a hall call stop shall be adjustable between 1 and 8 seconds. The hall call timing shall predominate in the event of a coincidental car and hall call stop. Upon interruption of the car door photo electric eye beam, the door open time shall be reduced to an adjustable time of 0.5 to 3 seconds. The photo beam control door dwell time shall be separately adjustable for car and hall calls. Dispatch floor dwell time shall be canceled when the system is on Down peak operation.
11. Anti-Nuisance: In the event car loading or operation is not commensurate with the number of calls registered, all car calls shall be canceled.
12. Load Weighing Bypass: The elevators shall bypass hall calls when their respective load weighing devices are activated, The new load weighing devices shall weigh the live load in the cab and provide a signal to the elevator control system when the live load has reached a predetermined level. Initially, the load weighing devices shall be set at 50%.
13. Nudging: In the event the doors are held open for a predetermined adjustable period of time, initially to be set at 20 seconds, after automatic door closing has been initiated, a buzzer shall sound and the doors shall be permitted to close at a reduced speed and in compliance with ANSI A17.1 Elevator Code.
14. Security Feature: Interface the new elevator controls with the existing Car Call Lock-out Security Card Reader System.

15. Hall Pushbutton Crossover Network: Prior to removing any cars from service for the modernization, a temporary crossover hall pushbutton network shall be furnished and installed to allow new and old cars to communicate to each other and provide advanced group dispatching. The Crossover network shall employ cross call registration and cross call cancellation until each individual elevator in the group is complete.

2.04 CONTROLLER DIAGNOSTICS

- A. The controller shall be non-proprietary and include the ability to perform diagnostic analysis of the system capable of determining faults. When a fault occurs, the computer shall be able to provide a retrievable fault code message identifying the location of the elevator, the time of day of the occurrence, and the number of times the fault has occurred. The fault information for each car shall be identified on the video screen in the machine room, or be capable of sending the fault information to a video screen in a remote location.

2.05 STATISTICAL DATA STORAGE AND RETRIEVAL

- A. The controller shall be capable of storing and retrieving statistical data to permit analysis and evaluation of the operating system response to traffic demand. Information to be stored shall include statistics relating to average waiting times for each floor serviced by the multiple car elevator bank, cars in service, frequency of car stops per car, activation of stop switches, etc. during a series of normal workdays, and other pertinent information which may be requested to be provided. Software and hardware, including printers, necessary to retrieve and print the data shall be provided to Owner. Statistical information shall be presented in a user friendly format and not require special training to interpret the data.
- B. A CRT display and terminal shall be provided in the elevator machine room as part of the elevator controller for informational and diagnostic use.

2.06 SECURITY SYSTEM

- A. Contractor shall provide means to limit access to each building floor. Insure the control/security system will allow Firefighter's and Independent Service to override the security system. Insure that the control system, while operating in a secure mode will perform and operate utilizing all normal dispatch and emergency features and functions. Provide provisions inside each elevator/s for "Owner provided" card or proximity reader. Provide the ability to "lock-out" floor calls and scale the degree of security access to each group of elevators within the Elevator Control System. Interface existing building car and/or hall call lock-out security system with new elevator control system.

2.07 FIRE COMMAND CENTER AND FIREMAN EMERGENCY OPERATION

- A. Fireman Recall/Emergency Operation shall include Phase I and Phase II operation in accordance with ANSI A17.1 2007 Elevator Code requirements and local governing Code requirements. Provide new digital LED direction indicators and hoistway position display, new two position keyed switch in accordance with ANSI A17.1 2007 Elevator Safety Code, new Car to Lobby key operated switches for each elevator, Auto/Manual Emergency Power sequencing, (allow two elevators to operate under Emergency Power Operation) and a new Intercom Communications Device shall be located in the new Fire Command Center, Machine Room, and each elevator cab.
- B. Fireman Recall/Emergency key switches shall be located in the main Fireman access floor elevator lobby and installed per the requirements of City/County of Denver Fire Department Requirements.

- C. All floor access restrictions shall be overridden on Fire/Emergency operation.
- D. The elevator control system shall be tied in with the building Fire Alarm system (Heat/Smoke Sensing Devices) and tested with the Fire Alarm system contractor.

2.08 EMERGENCY POWER OPERATION

- A. The existing emergency power system shall be connected to the elevators. In the event of a normal power supply failure, the elevator system shall be arranged to operate from an existing emergency power supply source and auxiliary contacts. The emergency power shall be available to all elevators in the system through the normal power feeders. The emergency power shall be of the same characteristics as the normal power and shall have the same phase rotation.
- B. Contractor shall provide circuitry in the elevator controller so that after normal power failure and establishment of emergency power, *two (2) elevators* shall automatically proceed to the designated landing where it will stop and deactivate with the doors open and with all of its power and operating circuits in an operable standby condition. After each elevator in the system has returned to the designated landing, *two (2)* pre-selected elevator shall remain operational in each elevator bank on the emergency power. Should the pre-selected elevator fail to operate, another elevator shall automatically be selected. The Emergency Power Operation switches may be integrated in the Fire Command Panel. The manual switch shall override the automatic selection and permit the operator to select any car. Upon restoration of normal power, all elevators shall return to normal operation.

2.09 INDEPENDENT SERVICE

- A. Independent Service operation, activated from the Independent Service switch, shall permit any one or more elevators to be removed from the system and used for special service without interfering with the normal operation of the remainder of the elevators operating within the system.
- B. When on Independent Service, the elevator shall be disconnected from the system and shall respond only to calls registered on the car buttons. Hall calls shall be automatically bypassed and hall lanterns and high call operation circuits shall be inoperative. The car doors shall close only when a car call button is pressed.
- C. In the event an elevator is operating on Independent Service and Fireman/Emergency Operation recall becomes activated, following a period of approximately 60 seconds, the elevator shall automatically override Independent Service and engage Phase I Emergency recall. This operation shall be subject to acceptance by Code and Code enforcement authority.

2.10 CAR TO LOBBY OPERATION

- A. The Car to Lobby keyed switches for each elevator shall be located in the Fire Command Center. When a switch is activated, the selected elevator shall complete the answering of whatever car calls had been registered then return non-stop to the elevator lobby. Upon arriving at the return floor, the elevator shall park with the doors open. Upon return of the key switch to the normal position, the elevator shall be returned to normal operation. This feature shall be overridden when on Phase I Fireman's/Emergency recall operation.

2.11 AMERICANS WITH DISABILITIES ACT

- A. Provide a voice announcement system and floor passing chimes. The elevator system operation shall comply with the requirements of the Americans with Disabilities Act. The existing hall lanterns shall provide a visual and audible signal of arrival of an elevator at a floor. The hall lantern audible signal shall sound once for an Up direction elevator and twice for a Down di-

rection elevator. The hall lanterns shall signal approximately 3 seconds prior to the arrival of the elevator to the floor. Doors shall open and close automatically and car doors shall include a door-reopening device. The door-reopening device shall remain operative for a minimum of 20 seconds. Door dwell time shall comply with the $T = D/1.5$ formula. Doors shall remain open for a minimum of 5 seconds for a hall call and 3 seconds for a car call. The car position indicator in the car shall provide visual and audible indication of when the car passes or stops at a floor.

2.12 DRIVE MACHINES AND GOVERNOR

- A. The existing Armor Elevator geared Hoist Machines. Thoroughly clean/remove all dust, dirt, and carbon debris from hoist machine, brake assembly, bedplate. Lubricate per manufacturers recommendations. Replace worn/defective bearing, thrust bearings, oil seals, and gaskets in order to eliminate excessive oil leaks, vibration, and noise. Furnish and install new AC hoist motors and couplings. (Imperial AC Motor "low slip" or approved equal and Electrical Motor Repair Co. – Mod Coupling Conversion Kits) If necessary, Contractor shall retain a structural engineer to verify that live and static loads of machine are acceptable with existing structural support.
- B. Install new Emergency Brake "Rope Gripper" in accordance with ANSI A17.1 Section 2.19 Ascending Car Overspeed and Unintended Car Motion Protection. Retain structural engineer, if necessary, to verify that live and static loads of existing machine beams are acceptable with existing structural support.
- C. Clean and lubricate deflector Sheaves. Replace worn bearings as necessary.
- D. Replace existing Governor, Tension Sheave and Governor Cables.
- E. Paint hoist machine, motor, brake assembly, and bedplate.

2.13 CAB SHELL/INTERIORS

- A. Retain the existing cab shell interiors. Eliminate all squeaks, rattles, knocks, and vibration in each elevator cab. Replace "Rubber Isolation Pads" if needed.
- B. Provide "Top Emergency Exit" accessible for top of car with emergency switch per code.

2.14 SIGNAL FIXTURES AND ACCESSORIES

- A. Remove the existing GAL Main Car Operating Panels. (COP) Furnish and install new Main (A17.1 2007 compliant), and refinish the existing #4 satin finish stainless steel front return panels as needed to appear "like new.". The new Car Operating Panels shall comply with the ANSI A117.1 Barrier Free Code and A.D.A. code requirements.
- B. Each COP shall include LED illuminated pushbuttons marked to correspond to the landings served, a keyed "emergency stop" switch, a "door open" button, and "door close" button. The floor pushbutton shall be illuminated when a call has been registered and shall remain illuminated until the car reaches the indicated floor. In the lower portion of the Main COP a Service Cabinet shall be provided and contain a key operated Car Light, Fan switch, Independent Service key switch, Emergency Light test switch, and a grounded GFIC outlets. A phase II emergency fire service key switch with On, Off and Hold shall be located behind a locked cabinet per A17.1 2007 Elevator Safety Code. Above the phase II keyed switch, the required instructions for phase II shall be engraved. A fire service indicator light and fire phone jack and blank

keyed switch for future use shall be provided. Furnish and install a new “hands free” Communications Device in accordance with ADA requirements.

- C. A two-way communications device (intercom) shall be provided in each elevator cab, Fire Command Center, and elevator machine room. If the device is connected to the building power supply it shall automatically transfer to a source of emergency power within ten (10) seconds after the normal power supply fails and be capable of powering the communications system for a minimum of four (4) hours. The communications device shall be integral to the new car stations and from the car be voice activated.
- D. An electrical digital position indicator shall be provided in both the Main COP, and so arranged that as the car travels through the hoistway its position shall be indicated by illumination of a numeral corresponding to the landing at which the car is stopped or passing. The digital position indicators shall be mounted in the upper portion of each new car-operating panel.
- E. Upon arriving at a floor, the new **Voice Annunciated System** shall announce the floor in which the elevator is sitting as well as the intended direction of travel. An audible signal (Floor Passing Chime) shall be provided to indicate to a passenger on the elevator car that the car is stopping or passing a floor.
- F. A battery operated emergency car light device shall be installed which will automatically turn on and operate immediately after normal car lighting power fails. The lighting device shall be so installed in the car enclosure to provide an intensity of illumination 4' above the car floor and approximately 1' in front of the car operating device of not less than 0.2 foot candles. The battery power shall be capable of maintaining the above referenced illumination for a period of not less than four (4) hours.
- G. An emergency alarm bell shall be connected to a plainly marked pushbutton in the car-operating panel and to the battery operated emergency car light device.
- H. Remove the existing Hall Call Pushbutton Stations and furnish and install new landing pushbutton stations. Each intermediate station shall consist of two illuminated pushbuttons, one for the up direction and the other for the down direction. Each terminal station shall contain an illuminated pushbutton. The buttons shall be illuminated to indicate that a call has been registered at that floor for the indicated direction. Stations shall be installed to comply with the ANSI A117.1 Barrier Free and ADA Code requirements. If possible, the existing electrical boxes shall be retained and new flush mounted faceplates with tamper resistant fastenings provided. The new buttons shall be located in the same location for most floors. On most floors the buttons will have to be lowered to 42” center. All cutting and patching including trim work shall be by Contractor. The faceplate finishes shall be **#4 satin finish stainless steel** and each faceplate include engraved “ANSI Appendix H Engraving Detail.”
- I. Provide a new car top inspection station with an "emergency stop" switch, constant pressure "up-down" direction buttons, light and light switch shall make the normal operating devices inoperative and give the inspector complete control of the elevator.
- J. At the main lobby floor furnish and install new three (3) position Firefighter’s key switch for phase I and phase I instructions as require by the City of Las Vegas Fire Department and State of Nevada Elevator code authority.

- K. Install Key Operated Hoistway Access Switches at the Top and Bottom landings. Provide a key-operated hoistway access device and car top operating device. Key switches shall be mounted in or adjacent to the door frames with only the ferrule exposed at terminal landings. Means for limiting the travel of the elevator from the Hoistway Access Switch shall be provided in accordance with the current code requirements.

2.15 DOOR OPERATING EQUIPMENT

- A. Remove existing car door operators, headers, tracks, clutch, and accessories. Retain the existing Car Doors. Furnish and install new direct current motor driven heavy-duty operator on all cars. (GAL – MOVFR or approved equal) The door operators shall be designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel. Doors shall automatically open when the car arrives at a landing and shall automatically close after an adjustable time interval or when the car is dispatched to another landing. The door operator shall be fully closed loop providing direct current feedback and continuously monitor the position of the door throughout the door travel. The door operator shall be capable of applying more torque for heavy lobby doors and to handle varying hoistway wind conditions. Provide “Car Door Restrictors” to prevent the car doors from opening when the elevator is outside the “leveling zone.”
- B. Provide a new solid-state *Janus Elevator Products, Inc.* “Panachrome” electronic detector designed to operate as described below:
1. During the “Open” cycle, the “Panachrome” electronic door detector shall illuminate and flash *Green*. During the “Close” cycle, the “Panachrome” electronic door detector shall illuminate and flash *Red*.
 2. After a stop is made, the doors shall remain open for an adjustable time interval. Closing may be initiated instantaneously by registration of a car call, operation of load weighing device or signal from the service demand integrator.
 3. The doors will remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a predetermined time, a buzzer will sound and the doors will close at reduced speed.
 4. If a passenger or object is detected during normal closing operation, the doors will immediately stop and reopen. Closing will be initiated one-half second after the passenger or object has been removed from the opening.
 5. The doors shall remain open for an adjustable time for a stop in response to a car call and a second variable time for a stop in response to a hall call. If the beams of the electronic detector are interrupted and reestablished, door open time for a car stop and for a hall stop shall be reduced.

2.16 CAR EQUIPMENT

- A. The existing car sling shall be cleaned, painted, and reused. The cab isolation pads and cab steadiers shall be replaced and or upgraded to ensure smooth and quiet isolation from the sling/platform to the car. Eliminate all squeaks, knocks, and rattle noise.
- B. The existing car safeties shall be retained, cleaned and adjusted to ensure proper operation.
- C. Provide a Top of Car Emergency Exit with electrical switch.

- D. Provide “Fire Horn” on Car Top.
- C. Provide “Car Top Railing” per code.

2.17 HOISTWAY EQUIPMENT

- A. Replace the existing Car and Counterweight roller guide assemblies to achieve quiet and vibration free ride.
- B. The existing counterweight frames and weights shall be retained. Eliminate all rattles, knocks, and squeaking noise from the counterweight frames.
- C. Each elevator shall be suitably counterbalanced for smooth and economical operation. Cast iron or steel plate weights shall be contained in a structural steel frame. The counterweight shall be equal to a complete elevator car and approximately 40% of the specified load. The existing counterweight frames and filler weights may be reused. Contractor is responsible for properly balancing the load.
- D. Remove the existing hoistway slowdown and directional Limit Switches. New electric limit switches (TLS) shall be placed in the hatchway near the terminal landings and be designed to cut off the electric current and stop the car should it run beyond either terminal landing.
- E. The existing car and counterweight rails, brackets and fishplates shall be retained. Tighten any loose bolts and align rails as needed in order to produce a smooth ride.

2.18 HOISTWAY ENTRANCES

- A. The existing hoistway entrances and door panel equipment shall be retained. Clean, lubricate, adjust, and restore to “like new condition” the existing hoistway door tracks, closers, interlocks, and pick up rollers. Replace door roller with new. Replace worn/defective tracks, hanger rollers, closers, interlocks, and pick up rollers in order to interface/operate with the new GAL – MOVFR. The interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by Code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing. Interlocks shall bear Underwriter's Laboratories "B" label.
- B. Hoistway door unlocking devices as specified by the ANSI A17.1 Code shall be provided to permit authorized persons to gain access to hoistway when elevator car is away from the landing. Provide “Top” and “Bottom” key-operated Hoistway Access in accordance with ANSI A17.1 Section 2.12.7.
- C. Provide new car door clutch in accordance with ANSI A17.1 2007 Code, Section 2.12.5.
- D. Retain fascia and ensure a flat even surface throughout. Check to make sure each piece is securely fastened to hanger housings and sill above. Replace any missing.
- E. Provide new extended Toe Guards (48 inches if possible) accordance with A17.1 – 2007 Section 2.15.9.
- F. Existing dust cover plates shall be retained. They shall be arranged to assure hanger accessibility from within the car.

- G. Furnish and install new door gibs. One at the leading edge and one at the trailing edge of each door panel.
- H. Retain floor designations with Braille at each hoistway entrance on both sides of the jamb.
- I. Provide floor numbers, not less than 4" in height on the hoistway side of the hoistway doors at intervals per code.
- J. Retain existing hoistway doors and frames. Each Hoistway door panel will be removed and presented to the UMC painting Department for refinishing. The door panels shall be removed as the elevator modernization proceeds down the hoistway to allow door panels to be re-installed as needed to insure safe open hoistway barriers.

2.19 PIT EQUIPMENT

- A. Retain existing car and counterweight buffers. Clean, inspect and test for proper operation.
- B. Remove unused materials, clean and paint pit and pit equipment.
- C. Retain and/or modify as necessary existing pit ladders to meet code. ASME A17.1 2007 Section 2.2.4.2.
- D. An emergency stop switch shall be provided in the elevator pit of each elevator. A stop switch shall be installed at the top of the ladder and at the bottom in accordance with Code. The switch shall be designed to cut off power to the elevator motor, apply the brake and bring the car to rest independent of the regular operating devices.

3.01 PERFORMANCE

- A. The elevator system shall be required to meet the following performance criteria.
 - 1. CONTROL
 - a. Design and adjust the equipment and the control so that the acceleration over the total accelerating period is smooth and comfortable.
 - b. Provide a shaft encoder as part of the operating system to accurately provide input signals to the control locating the exact position of the elevator within 3/16 inches.
 - 2. OPERATING TIME
 - a. Adjust the equipment to meet the times listed in the following chart:

	Cars id
Door Open	1.7
Door Close	2.8
Flight Time	10.5
Brake to Brake	6.5
Contract Speed +- 3%	350 FPM

- b. The following are criteria to be used when measuring the time durations:
 - 1. Brake-to-Brake time: Start measuring the time at the time the brake lifts and the car begins to travel to the next landing; stop measuring the time when the car is level at the next floor and the brake sets

2. Flight Time: Start to measure this time when the fully opened doors begin to close and continue to measure the time until the car is stopped level with the next floor and the car and hall doors are open to $\frac{3}{4}$ of their fully open position for center opening doors or $\frac{1}{2}$ open for side opening doors.
 3. A typical floor shall be 12'-0".
 4. Floor level is considered to be within 1/8 inch of level.
 5. The time is measured with full load in the car and in both directions of travel.
 6. The power door operation for the hall and car doors conforms to the elevator Code requirements.
- c. Adjust the equipment so that the operating speed in both directions of travel under load and no load conditions does not vary more than three (3%) percent.
 - d. Adjust the equipment so that the operating time as set out above is compatible with dependable, consistent operation without undue wear on the equipment, can be maintained without excessive maintenance and so that the 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 the floor level without overshooting, regardless of the load or direction of travel, so that the car sill is within 1/8 inch of level with respect to the hoistway sill.
 - b. Correct for overtravel or undertravel or rope stretch by returning the car imperceptibly to the floor, Releveling shall not commence within the 1/8 inch floor landing zone, above or below, with the doors in the open position. Releveling sequence of operation within this zone shall be initiated with the car doors in the closed position only.
4. DOOR TIME; DOOR OPERATION
- a. Arrange the doors to close with an average horizontal speed of no more than 1.0 FPS.
 - b. Arrange that the time necessary for the doors to operate as per the following:
 1. Opening: Start to measure when door starts to open and stop when fully open.
 2. Closing: Start to measure when door starts to close and stop when door is fully closed.
 3. Car & Hall Door Dwell Time: 3 seconds after stopping for a car call. Timer to be adjustable from 1 to 8 seconds, 5 seconds after stopping for a hall call. Adjust the hall call time as per ADA formula requirements.
 4. Reduced Short Door Time: Initially adjusted to 1 second after interruption of the electric edge to be adjustable from 0 to 10 seconds.
 5. Lobby Door Time: Initially set per ADA code requirements. Timer to be adjustable to between 5 and 15 seconds.
 6. Arrange that the door closing force, as measured when a door panel is stalled in the act of closing, does not exceed 30 lbs.
 7. Arrange the equipment so that the increase in noise level over the ambient noise level as measured within the cab, does not exceed four decibels at any time during a full door open, door close and door reversal cycle.

8. Initiate the door reversal by interruption of the proximity detector or photo ray beam.
5. BRAKE
 - a. Arrange for the brake to be able to stop the elevator with full load in the car from full speed in the down direction within the normal stopping distance of the car without shock or jar.
 - b. Test by turning the disconnect switch off under these conditions and measuring the resultant stopping distance.
 - c. Adjust the brake to hold a minimum of 125% of the contract load.
 - d. Design and adjust the brake so as to operate without discernible noise.
 - e. Adjust the brake to permit the brake to set after the car has stopped level at the floor on a normal stop for a car or floor call. Do not use the brake to assist in stopping the car at the floor on a normal stop.
6. SAFETY AND GOVERNOR TESTS
 - a. Arrange the safety so that the car stops with both no load and full load, on a safety test, without excessive acceleration, without damage to the equipment and within Code requirements.
 - b. Calibrate, test and seal the governor and document in accordance with Code requirements.
7. RIDE QUALITY
 - a. The horizontal ride quality (left to right and front to back) shall be 20 mg's peak-to-peak or less.
 - b. Ensure smooth quiet operation in full travel, floor-to-floor runs and door operation.

4.01 WIRING

- A. All wiring shall be new to ensure proper operation as set forth in this Contract/Specification. Some hoistway duct may be reused upon prior Consultant's approval.
- B. Provide one (1) Co-Axial Cables and four (4) sets of shielded cable in Traveling Cables, to be terminated at the top of the car junction box and at a point inside the elevator machine room or first floor landing. These wires shall be for Owner's use at a later date. Provide 10% spare for other wires. Provide wires for new card reader system to be installed on all cars.

5.01 MISCELLANEOUS WORK AND SCHEDULE

- A. This Contract/Specification covers all work as specifically set forth to bring the elevator system up to acceptable standards. Any additional work deemed necessary shall be brought to Owner's attention in writing ten (10) days prior to bid date.
- B. All work shall be performed during regular working hours of regular working days as is customary in the elevator industry.
- C. Only one (1) elevator shall be out of service at any one time in the performance of the work as specified, unless otherwise directed.
- D. Prior to commencing work, a work schedule shall be submitted to Owner for approval.
- E. Contractor shall confirm power, floor designation, emergency recall floors and dispatch floor locations, etc., prior to fabricating equipment.

- F. All material for all elevators must be onsite or stored in a local warehouse before cars are removed from service for this work. Owner or owners’ representative will inventory material prior to start of job. No exceptions to this item will be granted.
- G. Contractor shall provide all information, including necessary architectural and engineering information, required by Owner to coordinate the design and interface work of other trades impacting the elevator work.
- H. The following schedule shall be followed:

Phase I - Approvals and Materials Procurement	Base Bid
▪ Shop Drawings	3 weeks
▪ Shop Drawing Approval	1 weeks
▪ Manufacturing	12 weeks
▪ Deliver Material/Prep Work	1 week
▪ Total Duration Phase I	17 weeks

Phase II – Shut Down Period	Base Bid
▪ Remove 1 st Car for Modernization	12 weeks
▪ Complete Punch List	1 week
▪ Remove 2 nd Car for Modernization	10 weeks
▪ Complete Punch List	1 week
▪ Remove 3 rd Car for Modernization	10 weeks
▪ Complete Punch List	1 week
▪ Total Duration Phase II	35 weeks
Total Project Duration:	52 weeks

- I. Liquidated Damages:
 - 1. For each day Contractor is late during phase I of the project the contract price shall be reduced by \$100.00 per day.
 - 2. For each day Contractor is late during phase II of the project the contract price shall be reduced by \$200 per day.

6.01 TESTS

- A. Perform Phase I and Phase II Fire Service tests to conform to ASME A17.1, Section 3.27 “Emergency Operation and Signaling Devices.
- B. Perform acceptance tests to conform to ASME A17.1, Section 8.10.
- C. Completed copies of test reports shall be provided to Owner.

7.01 CLEAN UP AND INSPECTION

- A. Remove all debris resulting from work on this contract. Remove from project site all equipment and unused or removed materials and restore building and premises to neat, clean appearance.
- B. All materials and workmanship shall be subject to inspection or testing. Owner shall have the right to reject defective or inferior material or workmanship and require correction of such without additional cost Owner.

8.01 SCHEDULE OF PREAPPROVED COMPONENTS

- A. CONTROL SYSTEMS
 - 1. Elevator Controls (EC)
 - 2. Motion Control Engineering (MCE)
 - 3. Galaxy Controls (GAL)

- B. DOOR OPERATOR EQUIPMENT
 - 1. GAL (Closed Loop)
 - 2. Moline (Closed Loop)
 - 3. ECI (Closed Loop)

- C. SIGNAL FIXTURES
 - 1. Innovation
 - 2. Adams
 - 3. EPCO
 - 4. PTL

- D. OEM's (Contractors Alternate)

Manufacturers wishing to provide their own in-house components in lieu of the ones listed above are welcome to provide a "contractors alternate" bid, providing they first bid in accordance with the specifications and the "schedule of approved components" listed above. Additionally, it is understood that the OEM Manufacturers will provide full diagnostic equipment at the highest interface level including hand held tools, desk top, and lap top computers, as well as CRT monitors. Adjusters' manual, troubleshooting manual, as well as the service and owners' manuals will be provided. Leases for special tools will be unacceptable, as the tools will be provided to Owner with no conditions and full support of the OEM for 10 years whether or not they are maintaining the equipment.

End of Specifications