140000-H: CONVEYING SYSTEMS – GENERAL REQUIREMENTS

APPLICABILITY

The information expressed herein is unique to UMHHC owned, operated, and leased facilities. This guideline is a complete stand alone (replacement) document from the like document used University of Michigan’s Architecture, Engineering, and Construction (UMAEC).

The Design Professional (A/E) shall adhere to UMHHC Design Guidelines for all work at UMHHC facilities. Please take special note that the Campus Guidelines for Elevators shall not be referenced / used when doing work on UMHHC facilities. Any requested deviations from these guidelines, shall be sent, in writing, to UMHHC’s Facilities Planning and Development (FP&D). Address the correspondence to the assigned FP&D architect for the given project. The deviation shall not be incorporated into the construction documents until written approval of the deviation is received by the Design Professional.

The Design Professional is fully responsible for the professional quality, technical accuracy, code compliance, and overall coordination of the contract documents. Compliance with these guidelines shall not be construed so as to relieve the Design Professional of any of that responsibility.

GENERAL

In general, follow the guidelines below when specifying elevators and related items. Unless otherwise indicated, these guidelines are not intended to restrict or replace professional judgment.

1. There are specific brands and models for a number of elevator sub assemblies noted below for the overall elevator system(s).
   a. The below noted preferred manufacturers shall incorporate these sub-assemblies, for consistency sake across the UMHHC elevator systems, in any system they install.
   b. Any variance to these shall be noted in their bids.
2. University Preferred Manufacturers and Sub-Contractors
   a. Otis Elevator
   b. Schindler Elevator
   c. Kone Elevator

DESIGN AND INSTALLATION REQUIREMENTS

1. General Guidelines for Hydraulic & Traction Elevators
   a. For total rises, up to approximately 45 feet, (or low volume use applications), select a hydraulic type elevator machine.
      i. An exception to this would be parking structures and any other like environments with extreme daily or seasonal temperature swings.
   b. For total rises greater than 45 feet and/or high volume uses (where rise is less than 45-feet), select electric traction type machines. As noted above, parking structures and like environments shall typically have traction elevators, regardless of total rise

ADDITIONAL SCOPE OF WORK FOR MODERNIZATION OR REPLACEMENT PROJECTS

1. When project scope consists of elevator modernization or replacement; cover the following in the project specifications:
   a. Two weeks prior to shutdown of the elevator equipment, elevator contractor must notify UMH. Maintenance so they can tag any parts to be salvaged.
   b. Contractor to remove tagged parts, transport parts to building's loading dock, and notify U of M elevator dept. which in turn shall remove salvaged parts from site.
   c. All other equipment will become property of contractor who in return will remove same from site in accordance with all codes and regulations.
d. Whenever possible, on multiple elevator cab (bank) systems, the design shall maintain at least one of the cabs in service at all times. When this is possible, the elevator lobbies shall remain available during construction to maintain access to the cab in operation.

REQUIREMENTS OF REGULATORY AGENCIES

2. Give all necessary notices, obtain all State permits, and pay all fees necessary in connection with the installation, including sales and use taxes as applicable.
3. Make all tests as are called for by the regulations of such authorities. These tests shall be made in the presence of the authorized representative of such authorities and the Owner's representative.

GUARANTEE

The Elevator Contractor shall guarantee that the materials and workmanship of the apparatus installed are first-class in every respect, and that he will make good any defects not due to ordinary wear and tear or improper use or care, which may develop within one year from the date of final payment.

OPERATION AND MAINTENANCE MANUALS

After completion of the installation, the elevator subcontractor shall furnish four (4) complete sets each of "as-built" wiring diagrams, parts catalogs and job specific service manuals to the Owner.

MAINTENANCE

1. After completion of the installation, maintenance and 24 hour callback service for the equipment shall be provided for a period of twelve (12) months as part of this Contract.
2. This service shall also include regular examination of the elevator system during regular working hours by trained employees of this Contractor, and shall include all necessary adjustments, greasing, oiling, cleaning, supplies and parts to keep the equipment in proper operation, except parts made necessary by misuse, accidents or neglect caused by others.
3. All maintenance service must be performed by the installers and not by any other service agencies. Also, the installer must have an established maintenance and service organization available for performance of regular and emergency service, 24 hours a day, every day of the year and respond to the job site within two hours of a call.
4. The elevator contractor shall be responsible to service and maintain all elevator emergency circuits (including the fire capture circuit, related equipment and sensors) as part of the regular elevator maintenance contract.

ELECTRICAL WORK

1. General Electrical Requirements:

In buildings with 480/277-volt power, the elevator shall be specified to operate on 480-volts. In other locations specify 208-volts.

The elevator controller shall be supplied by a fused disconnect switch. Circuit breakers are not to be used

   a. Install a 3-phase, 4-wire, electrical power panel in room to feed all 'utilities in the elevator machine room.
   b. Refer to items titled "Elevator Machine Room" and "Elevator Hoist-way and Pit" for additional requirements. Refer to 1.24 and 1.25.
c. Wiring shall be furnished and installed to connect all parts of the equipment furnished by the elevator contractor. Wiring shall conform to the requirements of the UMH Electrical Guidelines, and the 2005 National Electrical Code.

d. Include rigid conduit or EMT, at least 1/2" diameter, and short lengths of flexible conduit. Conduit or EMT shall terminate in junction boxes. Conduit, EMT, wiring duct, conduit fittings, enclosures and junction boxes shall be galvanized steel or aluminum.

e. All power wiring, not in traveling cables, shall be THHN or THWN-2 and shall be installed in raceway as noted above.

f. Splice cables and wires only in outlet boxes, junction boxes or pull boxes.

g. Install cable supports for all vertical feeders in accordance with the NEC. Provide Kellum GPIP type supports which firmly clamp each individual cable and tighten due to cable weight.

h. All control terminal strip, and connected wiring shall be identified with corresponding reference numbers from cable termination chart and electrical single line diagrams.

i. Provide two dedicated telephone lines (one for emergency service and one for modem) terminated in a junction box in elevator machine room.

j. Provide a duplex electrical receptacle (3 ft. above finished floor), light and switch in the pit.

k. Provide a duplex electrical receptacle, light and switch within 18" of lock side of jamb in machine room.

l. Provide duplex electrical receptacle near controller, and additional electrical receptacles as required to meet ANSI 17.1 and N.E.C. Codes. Light in the pit shall be operable.

m. All electrical receptacles shall be GFCI type

n. Provide conduit with pull wire between nearest telephone closet and junction box in elevator machine room for elevator telephone.

o. Provide separate wiring and 2-pole 30-ampere, fused disconnect switch for

i. Car lighting,

ii. Monitoring devices and ventilation, located in elevator machine room.

2. Work by Elevator Contractor (Also refer to item A. above):

a. In accordance with Michigan Elevator Code, all power work from main disconnects switches in elevator machine room to controllers and other elevator equipment shall be provided by the elevator contractor.

b. Traveling cables shall have flame retarding and moisture resisting outer cover. They shall be flexible and suitably suspended to relieve strains in the individual conductors. Provide the required quantity of conductors (including two shielded conductors for telephone per elevator) plus at least 10 percent spares. All wiring between telephone cabinet in car and a junction box in elevator machine room shall be provided by the elevator contractor. Conductors shall be numbered to correspond to numbered terminals at the car and machine room.

c. Terminal blocks shall be coded to identify the circuits. Multi-conductor cables shall have the conductor color coded and numbered.

d. Each elevator car shall be provided with a suitable lamp fitted with a wire lamp guard on top of the car and a GFCI duplex plug receptacle. Refer to 1.10, and App. B.

e. Unless otherwise specified, control wiring shall be minimum size #18 AWG. Wire size shall be large enough so that the voltage drop under inrush conditions will not adversely affect operation of the controls.

f. Electrical Receptacle in Car: Provide duplex GFCI electrical receptacle in car. Locate receptacle approximately 2" above finished floor below car station. Provide matching face plate on receptacle. See also 1.16.

g. Phase Protection: Provide 3-phase power monitor for elevator power supply which monitors phase loss, low voltage, phase reversal, phase unbalance, and has an automatic reset.

h. Motors above 25-HP at 208-volt, or above 40-HP at 480-volt, shall be inverter rated. Said motors shall be powered from a ‘soft-start’ starter or a VFD.

i. The elevator equipment shall be designed to limit the total harmonic distortion (THD) reflected back into the power system to the following values at any motor speed from 50 to 100 percent. Please note that after startup of the system, the University may measure actual reflected THD. If the below noted limits are exceeded the Elevator
Contractor shall provide at no additional cost any additional devices required to meet the below noted THD limits.
   i. Equipment input voltage waveform: less than 3% THD
   ii. Equipment input current waveform: less than 100% THD

3. Work by Electrical Contractor (Also refer to item A. above):
   a. Adequate power from the power mains to fuse-disconnect switches in machine room rated to requirements of motor(s). Circuit breakers are not acceptable.
   b. Provide a duplex electrical receptacle (3 ft. above finished floor), light and switch in the pit.
   c. Provide a duplex electrical receptacle, light and switch within 18” of lock side of jamb in machine room.
   d. Provide duplex electrical receptacle near the elevator controller, and wherever else needed to meet ANSI 17.1 and N.E.C. Codes. Light in the pit shall be operable
   e. All electrical receptacles shall be GFCI type
   f. Provide conduit with pull wire between nearest telephone closet and junction box in elevator machine room for elevator telephone.
   g. Provide separate wiring and 2-pole 30-ampere, fused disconnect switch for
      i. Car lighting,
      ii. Monitoring devices and ventilation, located in elevator machine room.

FURTHER DETAILS ON THE SELECTION OF ELEVATOR EQUIPMENT AND SYSTEMS

1. When hydraulic elevators are required as noted in paragraph 1.0, select a hydraulic type elevator machine.
   a. Specify a dry pumping hydraulic unit. That is, the pump, motor, and valves should not be located in the hydraulic fluid.
   b. Note that piston stabilizers are not allowed.

2. In all other applications use traction type elevators

3. Elevator speeds shall be within the ranges noted below. Review elevator speeds however, based upon occupancy, with Design Manager.
   a. Electric Traction Elevators
      i. Minimum: 200 ft/min.,
      ii. Maximum: 350 ft/min.
   b. Hydraulic Freight
      i. Minimum: 25 ft/min.
      ii. Maximum: 100 ft/min.
   c. Hydraulic Passenger
      i. Minimum: 100 ft/min.
      ii. Maximum: 125 ft/min.

4. Elevator Control/Controller - For both hydraulic and electric traction elevators: Specify
   a. Microprocessor controls either proprietary or non-proprietary.
      i. A web base interface shall be offered as an option, for monitoring and/or maintenance purposes. [While the manufacturer or their service representative will in most cases be doing the service, the University may want the ability to do system monitoring and checking.]
      ii. Will have needed capability to connect into and to interact with equipment in the fire command center of the building, if said room is present
      iii. The needed software, licensing for multiple users, and security access for monitoring, checking, and updating of vocal messages in the system, shall be provided to owner as part of the quoted price for the work.
      iv. If special cables are needed to ‘plug-into controller’, several of these shall be provided also.
   b. All controllers shall have an input to accept an ‘On emergency Power’ signal. When said signal is received, each cab in sequence shall be lowered to the specified landing with only one cab remaining available.
   c. Electric traction elevators shall have:
      i. Variable frequency drives (VFD) sometimes referred to as soft-start. Said VFD’ shall meet the harmonic distortion noted in the VFD Design Guideline (220514-
H) in either the up or down modes of operation, and with either light or full loads in the cabs
ii. Include with the controller package a circuit designed to detect the failure of the brake to lift. Detection of this failure shall be by means of a mechanical switch and shall take the elevator out of service at the next stop and remain out of service until the condition is corrected.

**HYDRAULIC ELEVATOR CYLINDER UNIT**

1. The cylinder shall be fabricated from steel pipe and provided with a removable cylinder head and packing gland at the top. The cylinder head shall have a bronze, babbitt or phenolic-lined bearing and an integral drip ring. Packing shall be of the self-adjusting type.
2. The exterior of the cylinder shall be treated with a corrosion resistant compound and double-lap wrapped with a commercial grade wrapping, such as Scotch-wrap or Tape-coat, before installation.
3. Provide an outer cylinder casing using at least schedule 30 steel pipe. Provide a PVC liner between outer casing and cylinder unit, sealed at the bottom. Use only clean, dry sand to fill void between outer casing and the liner and between the liner and the cylinder unit.
4. Evaluate soil conditions from a cathodic corrosion perspective. Unless the study shows no need, include a cathodic protection system to protect the cylinder for a projected 25-year life.

**LANDING SYSTEM**

1. The landing system shall provide high speed stepping signals, one-floor-run stepping signals, leveling, and door zone signals. Each output signal shall be electrically isolated and shall be capable of reliably operating at 120 VAC.
2. The leveling and stopping accuracy of the system shall be within 1/4 inch of the floor level and shall correct for over travel or under travel to within the same accuracy, regardless of load variations or direction of travel.

**HOIST-WAY DOOR UNLOCKING, TOP-OF-CAR INSPECTION, AND PIT EMERGENCY STOP**

1. Furnish and install hoist-way door unlocking and top-of-car inspection devices in accordance with requirements of the latest Edition (currently accepted by State of Michigan) of the American Standard Safety Code for Elevators, Dumbwaiters, and Escalators (ANSI/17.1), and as permitted by the Local Code.
2. The following equipment shall be furnished:
   a. Hoist-way door unlocking devices shall be installed at all landings with removable plugs and as required by local codes.
      i. The hoist-way door unlocking device shall unlock and permit the opening of the hoist-way door from the access floors irrespective of the position if the car.
      ii. The design of the device shall be such as to prevent unlocking the door with common tools.
      iii. The means for unlocking the door shall be available and used only by inspectors, maintenance men, and repair men.
   b. Car Top Inspection Station
      i. A car top inspection station shall be located between the car crosshead and hoist-way door, complete with an Emergency Stop Switch, an inspection switch, and Up, Down & Safety Operating Buttons. In addition, if elevator is equipped with fireman's service, car top station must include an audible and visible indication in the event fireman's service is activated.
      ii. To operate the top-of-car operating device, the inspection switch shall be turned from "Car" to "Top" which shall transfer operation to the top-of-car device. Movement of the car shall be controlled by continuous pressure of the appropriate direction button and a safety button. Operation from the top of the car shall not be permissible unless all electric door contacts are closed.
iii. Provide a light w-guard with On-Off switch at inspection station and GFCI duplex electrical receptacle.
c. An Emergency Stop Switch in the pit.
d. Provide a switch, which meets Elevator Code, and can be padlocked out.
e. Provide hoist-way access features operable from top and bottom landings.

LANDING DOOR HANGERS

1. Each hoist-way door section shall be suspended by two sheave-type hangers running on a drawn steel track. Each hanger shall typically consist of a polyurethane tread on a metal hub equipped with precision ball bearings mounted onto a steel bracket. The hanger sheaves shall be not less than 3-1/4 inches in diameter.

2. The drawn steel track shall be so shaped as to permit free movement of sheaves without regard to vertical adjustment of the sheave brackets. An up-thrust roller shall be provided beneath the track and each sheave wheel, capable of withstanding a vertical thrust equal to the carrying capacity of the upper sheave. The up-thrust roller (equipped with ball bearings) shall be adjustable for fine vertical adjustment and the face of the roller shall be so shaped as to conform to the bottom face of the hanger track.

3. Entrances which have multiple door sections shall be provided with a suitable coordinating mechanism to transmit motion from one door panel to the other.

DOOR PANELS

1. Door panels must be a minimum of 18" wide.
2. Use single or two speed door operation only, side slide or center opening.
3. For freight elevators use power operated, bi-parting, center opening, vertically operating freight loading type doors.
4. Each door panel shall be provided with minimum of two door guides.

DOOR OPERATION

1. Passenger and Service Elevators:
   a. The car and hoist-way doors shall be operated quietly and smoothly by an electric operator which shall open and close the car door and respective hoist-way door simultaneously. The doors shall open automatically when the car is leveling at the respective floor and, when operating without an attendant, shall close after a predetermined time has elapsed
   b. Momentary pressure on the "Open Door" button in the car shall cause the doors to remain open or, if closing, to reopen and reset the time interval.
   c. The opening speed of doors shall be approximately 2 ft. per second, but the closing speed shall be reduced to approximately 1-1/4 feet per second.
   d. Provide door pre-opening feature with switch to disable this function.
   e. Door Protection: Do not specify incandescent type light beams or mechanical safe edges. Specify infrared type beams only.

2. Freight Elevators: Provide power-operated, vertical, bi-parting door operation.

GUIDE RAILS AND ROLLER GUIDES FOR CARS

1. Minimum Rail Size - 15 pounds/ft. upgrade rails based on application.
2. Passenger and Service Elevators:
   a. Each roller guide shall consist of minimum of three wheels (minimum roller diameter - 6") tired with a durable resilient material; each rotating on ball bearings having sealed-in lubrication; all assembled on a substantial metal base and so mounted as to provide continuous contact of all wheels with the corresponding rail surface under all conditions of loading and operations.
   b. The wheels shall run on three finished rail surfaces.
c. The roller guides shall be properly secured at top and bottom on each side of car frame. Provide roller guides at top and bottom of car.
d. The roller guides shall run on dry guide rails.

3. Freight Elevators: Use either roller guides or slide guides.

**SIGNAL FIXTURES**

1. Car Operating Panel  
   a. The operating devices in the car shall consist of a vandal resistant stainless steel flush mounted control panel.
   b. The control panel shall contain a series of push buttons with illuminated call registration devices, numbered to correspond to the various landings serviced;
      i. An in the car, Keyed Stop Switch,
      ii. Alarm Button (connected to a bell located in/on the car),
      iii. Alarm bell shall be operated from the battery providing emergency lighting,
      iv. Door Close and Door Open button for each entrance.
   v. The control panel shall also contain separate key operated switches for:
      1. Independent service, Car lights,
      2. Inspection
      3. Car fan
      4. All keyed to "Adams standard keying system" (Note -Inspection key switch shall activate inspection circuit and disable automatic door operation).
   c. Auxiliary panel, if required, shall contain all floor buttons; alarm, door open and door close buttons for each entrance. Whenever key switches are required; the key switch cylinders shall be Best Co.7-pin tumblers keyed to U of M lock system. Contractor shall contact U of M key Office through Owner's representative.

2. A gong shall be provided at the handicap floor entrance to comply with barrier-free code requirements.

3. All buttons shall conform to the University of Michigan Barrier Free Elevator Guidelines.
4. Car Telephone: Provide hands-free vandal resistant type emergency phone integral with car operating panel in car and two shielded conductors via trail cable to the machine room. Terminate phone connections in machine room in a junction box conveniently located for phone company installation.

5. Hall and Car Position Indicators shall be LED (Light Emitting Diode) digital type and shall have a minimum life of 5-years. Provide position indicators in car and at all landings.

6. E. Hall Push Button  
   a. Vandal resistant illuminating LED type hall push buttons shall be installed at each floor to permit waiting passengers to call the elevator to the floor.
   b. Fixtures shall have up and down buttons at intermediate floors and single buttons at top and bottom floors.
   c. Buttons shall be made of vandal resistant stainless steel with integral up or down arrows and shall illuminate to indicate a call has been registered.
   d. Button shall remain illuminated until the call has been answered.

**ELEVATOR CAR ENCLOSURE**

1. Lighting:  
   a. In general indirect fluorescent or cove lighting shall be used. Do not use any incandescent lighting.
   b. Provide standard length light fixtures with 2-foot or 4-foot lamps. Alternately, use compact fluorescent lighting and
   c. Install fixtures equally on both sides of elevator cab to balance the light that is emitted.

2. Coordinate all interior cab finishes with UMH Interior Design
3. Finished floor:  
   a. Passenger Elevators and Service Elevators shall have either
      i. Heavy duty "sheet vinyl or rubber" directly glued to floor or
      ii. "Commercial grade carpeting" or
iii. Heavy duty tile
   b. Freight elevators shall be made of 1/4” thick (minimum) checkered aluminum plate.

4. Emergency Lighting: The elevator car shall be provided with emergency lighting with a battery powered unit in compliance with code requirements. This should be integral with the car operating panel.

5. When requested by the University, provide an alternate for Pads and Pad Hooks (Passenger & Service Elevators only). Provide pad hooks on walls near top 12” on center. Provide protection pads for all walls.

6. Class of Loading for Elevator Provide class C-1 loading for all types of elevators. (For modernizations - Discuss any exceptions with University Project Coordinator)

7. Car Telephone See Section Titled (Signal Fixtures)

8. Electrical Receptacle in Car Provide GFCI type duplex electrical receptacle in car. Locate receptacle approximately 2” above finished floor below car station. Provide matching face plate on receptacle.

9. Ceiling Height in Elevator Car - Minimum 8'-0”.

10. Elevator Enclosure Provide a steel elevator cab enclosure. Attach all finish wall panels to the steel shell. Construct canopy from formed and reinforced 16 gauge steel. Provide an emergency exit panel in canopy.

HOIST-WAY ENTRANCES

1. The entrances shall consist of flush hollow metal door panels, bolted unit type frames, sills, hanger covers, fascia plates or toe guards, headers, struts, sight guards and hardware. Rubber astragals shall be provided for center opening doors.

2. Sills: Sills shall be of extruded aluminum or stainless steel construction with a non-slip wearing surface. They shall be supported on steel brackets and securely fastened to the floor. Grooves for the door guides shall have minimum clearance for the guides. For harsh environments (e.g. Parking Decks) - use corrosion resistant sills. Sills shall be designed for class C-1 loading.

3. Hanger covers: Hanger covers shall be fabricated of No. 14 gauge steel extending the full width of the hanger pocket.

4. Fascia: Fascia plates shall be constructed of No. 14 gauge steel, adequately reinforced to ensure a flat surface, spanning the width of the opening plus 6 inches, and fastened to the header and the sill above.

ACCESSORIES

SUBMITTALS

1. **Shop Drawings:** Submit eight (8) copies of Shop Drawings as required showing the general and detailed arrangement of all elevator equipment. Show ceiling, lighting, and signal fixtures (Including layout and conduit routing for smoke detectors). Following is a brief summary, but not exhaustive, listing of items. While the below listing apply mainly to traction machines, the scope of desired drawings for hydraulic machines may be inferred.
   a. Legible schematic wiring diagrams including all changes made during installation.
   b. Description of operation of elevator system being supplied – type, sizes, weight limits, speeds, etc.
   c. Hoisting machine: Including Motor size and ratings, motor starters/soft-start starters and/or VFD’s, Brake, Geared Machine and associated devices such as Tach Motors or Monitors.
   d. Deflector Sheaves, Governor and Governor Tail Sheaves, Safeties, Buffers.
   e. Counterweight Assembly, Guide Rollers on Counterweight and Car, Cable Shackles.
   f. Controller and Selector: Including parts information on Relays, Printed Circuit Boards, Reverse Phase Relays, Switches, Lamps, Electrical Cables, Monitors, Modems, Diagnostic Hardware, Diagnostic Software, and Overload Protection Devices.
   g. Door Assemblies: Including Hangers, Rollers, Door Motor, Door Operator, Door Clutch Assembly, Door Closers, Door Drive Arms, Related Hardware, Sheaves, Door Guides, Interlocks, Safety Door Edge.
h. Signal Equipment: Including Car Station, Hall Stations, Position Indicators, Direction Indicators, Fire Service Panel, Smoke Detectors, Key-switches, Push-button Assemblies.

i. VFD Drive Units, Transformers, Chokes.

j. Car Top Inspection Station, Limit Switches, Solid State Leveling Control Units, Leveling Switches, Alarm Bell.

k. For Hydraulic Units - Pumps, Valves, Motors, and Cylinders.

2. Final Submittals: Provide four complete sets (bound and properly arranged) of the parts lists and operators manuals prior to receiving final payment. Items covered shall also contain ‘as-builts of information given in shop drawings

OPERATING INSTRUCTIONS

(Ask for an Add Alternate to identify cost of this work, in Section-3 of bid documents) On site technical training shall be held for the purpose of familiarizing University of Michigan Elevator Support Mechanics with operations and troubleshooting procedures. The session shall accommodate up to ten personnel in each session and consist of forty hours of Training (This to include two 2-day sessions and the fifth day reserved for any additional diagnostic training). Training on equipment controller shall be provided by trained factory service engineers of controller manufacturers through the elevator installers. Submit details of training with bid.

ACCEPTANCE DEMONSTRATION AND PERFORMANCE TEST

Demonstrate to Owner, or Owner’s designated representative, the operation of the elevator system. Demonstration shall include general operations, fire service operations; operations during inspections, triage maintenance, and preventive maintenance of cab and hoist-way entrances.

PERFORMANCE GUARANTEE

The elevator subcontractor shall assume full responsibility to furnish and provide a complete and functional elevator and to obtain and furnish the University final State Elevator Inspection approval. All costs necessary to correct code deficiencies cited by the State Elevator Inspector will be paid by the elevator subcontractor as part of this Contract at no additional cost to the Owner.

KEYS

Car Operating Keys: Use manufacturer's standard keys only. Do not use high security keys (e.g. MEDECO Keys, Barrel Keys, and Magnetic Keys) that cannot be duplicated locally and by UMHHC.'s key office.

ELEVATOR HOIST-WAY AND PIT

Provide the following as noted here and above in 'Electrical Requirements:

1. Pit ladder.
2. Pit light and GFCI duplex receptacle 3 feet above finished floor. Refer to 1.7.C.3.
3. Provide a 16” diameter. By 30” deep sump in elevator pit with steel cover plate. A/E shall evaluate need for a permanently installed sump pump and if required provide all required power and controls.
4. Paint pit floor and walls (up to the sill) with two coats of light gray, gloss, and oil based paint.
5. Paint all exposed metal in hoist-way (except guide-rails) with two coats of rust inhibitive paint.
6. Provide raceway and box for a building fire alarm system heat detector to be installed at the top of the elevator shaft(s)
ELEVATOR MACHINE ROOMS

Provide the following:

1. HVAC: Provide adequate ventilation, heating and cooling to maintain ambient temperatures in room between 50°F - 95°F as required by the microprocessor controls.
2. Painting of Floor and Walls: Paint elevator machine room floor with two coats of light gray gloss oil based paint.
3. Painting of Elevator Equipment: All exposed surfaces of machines and motors, governors, etc., shall be touched up or repainted after field installation and before acceptance by Owner with rust resisting gloss enamel paint to match color of equipment as received from manufacturer.
4. Lighting: Provide 30 foot candles of fluorescent lighting in elevator machine rooms. Lighting shall be positioned so it does not create shadows while service personnel are working on major equipment. If elevator has emergency power, lighting shall also be on emergency power.
5. Fire Extinguishers: Appropriate classification 15 pounds fire extinguishers shall be installed.
6. Door: Provide an appropriately labeled, self closing, self-locking door and frame with storage room function hardware. Door to be keyed to U. of M. Best “XV” Key System. Contractor to contact UMH Security for cylinder.
7. Provide termination/pull box for incoming telephone service and data connection.
8. If the building is ‘fully fire suppressed, suppression shall also be installed in the machine room. As required by Michigan Elevator Code, there shall be a shut-off valve in the line feeding these sprinklers. Said valve will be outside the room.
9. It is highly recommended that a building fire alarm notification device be installed in the machine room.

SMOKE SENSING DEVICES AND SYSTEM FOR FIREFIGHTER’S SERVICES, AND ELEVATOR RECALL

1. Install a fully independent smoke detector system (independent from building fire alarm system), in elevator lobbies, to assist firefighters using elevators, and to recall elevators to designated floor(s), shall be installed as required by the ANSI 17.1 code and The Michigan Elevator Code.
2. A primary and secondary floor (when appropriate) shall be designated for this system.
3. This system shall be fully provided, installed and tested by the Elevator contractor.
4. Generally these detectors shall be photoelectric type, 120-volts (AC), Gentex Corp. Model 8100.
5. Submit drawings showing locations of smoke heads and exposed conduit for owner's approval prior to installation.
6. System shall provide a ‘trouble’ output contact for building fire alarm contact to monitor. This contact will close when the elevator smoke system is in alarm or in ‘trouble’. Wire the contact wiring to a box outside the elevator room.