

14 00 00. CONVEYING SYSTEMS

.1 The program statement for the project shall outline the preliminary requirements for conveying system. New and Modernized elevators shall be Open Market technology. New machine rooms, hoistways, and pits shall be designed to accept all manufacturer's non-Machine-Room-Less (MRL) elevators. Select equipment with regard to function and proper size to avoid excessive wear and provide long cable life. Locate hoisting machine and sheaves to avoid reverse bends in hoist cables. Hoist machine shall use stranded steel wire rope for suspension and counterbalance, be a non-proprietary product, available for purchase and installation by any licensed elevator contractor and shall be interchangeable with a minimum of two other elevator manufacturers' hoist machines, readily available in the elevator industry.

.1.1 CODES and STANDARDS

A. Architect/Engineer (A/E) shall use most current codes and standards unless superseded by this Building Design Standard. The following is a partial list of applicable codes and standards:

1. Ohio Building Code (OBC)
2. Ohio Mechanical Code (OMC)
3. Ohio Plumbing Code (OPC)
4. National Electrical Code (NEC)
5. American Society of Mechanical Engineers (ASME A17.1)
Safety Code for Elevators and Escalators
6. Accessibility (ICC/ ANSI A117.1)
7. National Fire Protection Association (NFPA 72)

14 20 00. ELEVATORS

.1 **PLANNING CONFERENCE:** The A/E and Elevator Consultant shall arrange with the University Project Manager for a meeting to discuss elevator requirements with the Department's Elevator Manager. The Elevator Consultant selection and their scope of work shall be approved by the University Architect (UA), University Engineer (UE), and the Department's Elevator Manager.

.1.1 **PRE-DESIGN ANALYSIS:** For each individual project and system, the A/E and Elevator Consultant shall submit the proposed design intent,



including but not limited to, providing traffic analysis for all buildings. Identify the type, size and capacities of proposed elevator(s) to the University Architect (UA), University Engineer (UE)/Technical Services Group (TSG), and the Department's Elevator Manager. Detailed plans and information of the intent must be sent to the project team early in the design phase. Designer The A/E and Elevator Consultant shall ensure that the multiple building systems that interface with the elevator are identified and code compliant.

- .2 USE OF EXISTING ELEVATORS (DURING CONSTRUCTION OR RENOVATION shall Refer to Division 01): If university permission is granted to use existing elevators, the contractor shall protect all equipment and be alerted that elevators will be inspected by the Department's Elevator Manager before and after construction to appraise any damage caused by this use. The General Contractor shall be required to arrange and pay for maintenance during this period, and to restore elevator equipment to pre-construction condition before the final project payment is authorized. The Department's Elevator Manager and the A/E shall designate the appropriate elevator for use.

Wexner Medical Center: Elevators deemed acceptable to use will be inspected by OSUWMC Facilities Operations personnel before and after construction to appraise any damage caused by the use. Pending approval by OSUWMC Facilities Operations, the A/E shall designate the appropriate elevator for use.

14 20 01. GENERAL REQUIREMENTS:

- .1 PRIMARY INTENT:
- a. Provide acceptable levels of elevator design and service as it relates to the Average Interval and handling capacity based upon building's needs.
 - b. Provide safe and convenient transport of passengers and materials.
 - c. Provide systems that give the highest level of accessibility for people with disabilities.
 - d. The A/E shall incorporate specific standardized parts for easy maintenance, quick repair or replacement.
 - e. Provide design for safety and, reliability that achieves desired lifecycle service and cost effectiveness.



- f. Installation of non-open market controller(s) and machine(s) are prohibited.
- .2 **CONTRACT:** Except as otherwise approved by the university, elevators shall be included in the general contract. Specify that all wiring installed by the elevator contractor shall comply with Division 26 of the specifications.
- .3 **PROVISIONS FOR SERVICING:** The elevator contractor shall provide evidence that they have a staffed service office with sufficient field mechanics that are able to respond to service calls within 30 minutes. Staff shall also include sufficient supervision and adjusters to meet all maintenance requirements and installations. Common wear parts shall be stocked locally and available the same day to make repairs. Other parts must be available to arrive on campus the next business day. Acceptable companies will have a history of more than five years of continuous elevator construction, modernization, service, repair and maintenance experience. Maintenance and callback service shall be provided for one year from date of university acceptance.
- .4 **MAINTENANCE BY ELEVATOR CONTRACTOR:** Beginning on the date of notice to proceed, furnish service and maintenance on all elevators in the common machine room and or building, depending on project, for a minimum of one year following overall project completion. Call back service shall be in accordance with the current university maintenance specification. Service shall include scheduled regular examinations and record keeping per the Electronic Maintenance Control Program (EMCP) for all the equipment:
- All Safety Test
 - Emergency communication devices - monthly.
 - Automatic Elevator Rescue units - monthly
 - Every elevator service shall be maintained in accordance with the EMCP.
 - Phone and fire service testing - monthly

Service shall be completed during regular work hours 6am to 6 pm by competent trained employees of the Elevator Contractor. The maintenance during modernization and warranty shall be code compliant and in accordance with university's maintenance agreement (provided by Department's Elevator Manager at time of project). Provide the Department's

Elevator Manager with copies of the maintenance history, program maintenance and repairs performed.

Wexner Medical Center: The contractor shall respond to entrapment calls within 30 minutes after notification, including evenings, weekends, and holidays. The contractor shall respond to maintenance callbacks within 45 minutes after notification, including evenings, weekends, and holidays.

.4.1 INSTRUCTIONS FOR MAINTENANCE PERSONNEL: The Contractor will furnish electronic and two _hard copies of: final wiring diagrams, technical manuals for all parts and tools. Equipment using diagnostic or adjusting tools are not permitted. Provide repair parts, the most up to date edition of catalogs, instruction manuals, lubrication charts, and required written instructions to the Department’s Elevator Manager to allow maintenance following the commencement of the warranty period.

.4.2 SPARE PARTS: Elevator Contractor/Manufacturer shall confirm that spare parts are available for purchase by any party on a non - exchange basis on installed elevator unit in the University Facilities and Campuses. Spare parts purchases shall be at cost plus applicable parts mark-up as designated by current university elevator maintenance agreement.

.5 WARRANTY:

- a. Prior to placing the elevator into service, the A/E shall schedule a final inspection of equipment. The final inspection shall include the Elevator Contractor, A/E, Elevator Consultant, General Contractor, University Project Manager and the Department’s Elevator Manager.
- b. The warranty shall include all labor to meet the EMCP requirements, and materials for period of 12 months after the university acceptance and the State of Ohio operating permit is issued.
- c. Emergency Service requests will be initiated by Service Facilities.

.5.1 INSPECTIONS AND WORK PERFORMED DURING WARRANTY PERIOD:

- a. The Elevator Contractor shall provide service in accordance with the EMCP requirements during the warranty period. The installing Contractor shall submit the report record using the EMCP application



including call backs of all work performed on the relevant elevator(s) which shall include improvements, repairs, and modifications to the Department's Elevator Manager. The report(s) submittal shall be through the following methods:

All work may be reported via the Department's Elevator Manager, Facilities Operation and Development's (FOD's) work order System and Service2Facilities call center, using the current Computerized Maintenance Management System (CMMS) as well as the EMCP application.

- Copies of all service reports, repairs, maintenance records, oil logs, and Department of Commerce Elevator Violation notices received, originated or maintained by the Contractor shall be furnished through electronic transmission to the Department's Elevator Manager for inclusions in the CMMS Data Base.
- Monthly testing of the fire service, alarm and emergency communication devices shall be provided. Provide EMCP record with copies of all service records and testing performed.

- b. At the 10th-month anniversary date, after State Elevator and University acceptance date, the A/E and Elevator Consultant shall contact the Elevator Contractor to arrange an inspection of the elevator equipment. The A/E, Elevator Consultant, University Project Manager and the Department's Elevator Manager shall verify that all elevator component parts are operating as designed. The A/E and the Elevator Consultant shall make certain that all deficiencies found are corrected prior to the warranty expiration and the elevator is re-inspected. The A/E and Elevator Consultant shall submit the final report of deficiencies and corrections in writing to the University Project Manager and the Department's Elevator Manager.

- .6 PERMITS: Elevator Contractor shall obtain and pay for all State of Ohio elevator permits and inspections, including callback inspections required for a final State Acceptance of the entire installation for new and modernization projects. Proof of Permit Application shall be furnished to the University Project Manager and the Department's Elevator Manager.

- .6.1 Combine permits and certificates of operation shall be obtained by the Elevator Contractor within 48 hours of State Acceptance and shall be provided to the University.

14 20 02. REQUIREMENTS:

Elevator Design and Installation shall comply with the current Ohio Elevator and Escalator Codes and all referenced national codes and Standards.

- .1 Access and Machine room: During Design, it is common practice for Design Consultants to need access to elevator machine rooms for field verification. All Consultants shall be escorted by the Elevator Contractor currently on contract or being utilized by the Department's Elevator Manager for maintenance. The University Project Manager and Department's Elevator Manager shall be contacted in advance for coordination.
 - .1.1 HOISTWAY and MACHINE ROOM: New elevator hoistways and machine rooms shall be sized in compliance with the National Elevator Industry, Inc. Vertical Transportation Standards, latest edition, and each hoistway and machine room shall be sized to accept all manufacturers' non-MRL equipment.
 - .1.1.1 Show Pit Ladder, Hoistway Sump Pump as required and other equipment on the Floor Plan of the Elevator pit.
 - .1.2 A/E shall detail locations of all support beams required in Hoistway. Indicate beams on building sections and details. For multiple Elevators in the same Hoistway, provide divider beams for guiderail support brackets.
 - .1.3 The Pit Floor shall be epoxy painted, including the Sump pump pit and up to first floor landing, color: light gray.
- .2 Sump pumps or drains in the pit maybe required. If a sump pump is installed on a hydraulic elevator, it must pump into an oil separator/collector sized for worst case scenario; check current edition of the Ohio Plumbing Code (OPC). Provide removable flush grate covers on sump pump holes.
- .3 HYDRAULIC ELEVATORS:

- .3.1 For Hydraulic Elevator, installation may also be provided with Sump Pump with integral oil sensor or other Alarm Notification means so that Pump will not operate if hydraulic fluid is contaminating the water (Products are available from SEEWATER, INC., (www.seewater.com), 1-888- 733-9283 and other Manufacturers).
- .3.2 Provide a high water alarm to detect pit water and move elevator to upper floor and remove from service and connect it to the building's energy Management system and as an emergency alert to Service2Facilities call center. This applies to all elevator pits and sumps.
- .4 HOISTWAY VENTING:
 - .4.1 Hoistway ventilation is not required by code.
- .5 MACHINE ROOM
 - .5.1 Elevator machine and controller shall be installed in a code compliant elevator machine room. Machine space does not constitute an elevator machine room. Machine room shall provide full body entry. Machine room door shall be outward swinging. Provide an ample elevator machine room with heating and cooling of elevator machinery spaces. Design a machine room with an air conditioning and/or heating unit to eliminate the effects of temperature and humidity on the electronic components. The elevator machine room temperature must be maintained between 60° and 90° Fahrenheit and 40% to 75% relative humidity. The air conditioner cannot be located directly over the elevator controller. There must be at least 7' headroom. A means to collect and drain condensation shall be provided. Drain cannot be hooked up directly into the sewers. Provide a safe way to service air conditioners in machine room. All exposed drives must be guarded. The Elevator Machine room ventilation equipment is a vital part of the elevator operation, it is therefore, required that the Elevator Machine Room's ventilation equipment be connected to standby power or emergency generator, if available, for reliability.
 - .5.1.1 Provide drawing plans and sections for the elevator machine room and all equipment, sprinklers where required, HVAC,

electrical, etc. Show machine room on elevations and roof top plans as relevant to all elevators.

.5.1.2 Only equipment required for elevator operation is permitted in elevator equipment spaces. No extraneous piping, ductwork, conduits, etc. will be permitted in elevator equipment spaces. Elevator machine room must be equipped with a light and duplex receptacle with GFCI. It must be on a separate circuit from the control equipment. Lights shall not be connected to the load side of a GFCI device.

.5.1.3 Elevator controller software updates shall be provided and installed immediately upon notification of such updates.

.6 WIRING and LIGHTING:

- a. Elevator machine room must be equipped with a light and GFCI type duplex receptacles on each wall of the machine room. It must be on a separate circuit from the control equipment.
- b. Provide properly sized primary or main line disconnect switch for each elevator to be mounted adjacent to the machine room door. In line of sight of the machine(s) and controller(s).
- c. Use only rigid steel conduit in the elevator machine room for main power equipment. EMT may be used for low voltage control wiring.
- d. Specify adequate and energy efficient lighting including LEDs that are interference free with controller and around equipment. Locate lighting to avoid conflict with repair, maintenance, installation of equipment such as motors and full removal of electrical cables.
- e. Elevator car lighting fixtures will be wall sconces with full battery backup.

.6.1 Provide the following dedicated travel cable data lines for each elevator:

- 1 Camera
- 1 Monitoring System
- 2 Spares

.6.1.1 Provide a hoistway lighting system for every elevator as follows:

- a. Install a light at the top of the hoistway.

- b. Provide light on top of the car approximately 24” above the car.
 - c. Locate lights at Pit Level, the corner of back wall of hoistway, where clearance allows.
 - d. If there is more than one elevator in the hoistway, provide lights between elevators near the divider beams, at Pit Level.
 - e. Provide 4-way light switches at the elevator pit, at the top of the hoistway, and in the elevator machine room.
 - f. Locate pit light switch next to pit ladder and above lobby floor level. Location of pit light switch shall be code compliant.
 - g. Provide LED fixture, lensed with wire guard.
- .6.1.2 When fire fighter’s emergency operation is active, the entire height of the hoistway shall be illuminated at not less than 1 foot – candle (11 lux) as measured from top of the car of each fire access elevator.
- .6.1.3 Provide Pit Safe pit lighting (<https://eciamerica.com/pitsafe/>) for both traction and hydraulic elevators. It includes Pit switch and pit lights (provided the pit is not so large it requires more lighting). also includes dry contacts for both water detection and oil detection.
- .6.2 Provide OBC approved stairs for access to elevator machine rooms. Ship’s ladders and alternating tread stairs are prohibited.
- .6.3 FIRE PROTECTION: Elevator Hoistways and Machine Rooms may be exempted from the requirements for Automatic Fire Protection Sprinkler heads in fully sprinkled buildings when in compliance with the requirements of OBC, NFPA and the following:
- a. An approved automatic fire detection systems that will respond to visible or invisible particles of combination connected to building fire alarm system.
 - b. Generator and Transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire resistance rating of not less than 2 hours.

- .6.3.1 A/E shall provide a note on the construction drawings prohibiting Fire Suppression in elevator Hoistways and Machine rooms when in compliance with OBC, OFC, and NFPA.
 - .6.3.2 SOUND CONTROL: If elevator machine room is adjacent to an occupied space, the A/E shall be responsible for determining if additional sound absorbing materials are required inside of the elevator machine room to comply with program of requirements.
 - .6.3.3 SHUNT TRIP: Comply with NFPA 72.
- .7 Provide proper separation between machine room and hoistway. Sound deadening material and fluid smell control systems is required for Hydraulic elevator machine rooms that are located next to classrooms, offices, student rooms, and occupied rooms.
- Wexner Medical Center: Hydraulic elevator machine rooms should not be located next to patient care rooms, conference rooms, or offices without sound deadening material. Provide the minimum acceptable SCT rating.**
- .8 Provide a tank heater or viscosity alarm monitoring control system for hydraulic elevator oil systems. Oil tank heaters shall be large enough to maintain freely flowing oil in the coldest seasonal conditions.
- .9 All elevators shall be designed with emergency power or a feature to lower the elevator to the closest available floor landing in case of a power failure, with an Emergency Return Unit (ERU).
- .10 Provide a well casing with a plugged bottom sleeved with scheduled 40 PVC or HDPE with an end cap for further protection for all hydraulic elevators, except holeless hydraulic elevators. In addition to the sleeved well casing, the cylinder shall be wrapped with Mylar tape or coated with an asphaltic application.
- .11 Provide Emergency Signs for Fire Fighters' operation at designated fire floor and emergency signs at each floor. Provide occupants signage at each floor with an etched graphic with the hall call station that says "Do Not Use Elevator In Case Of Fire" per elevator code. Signs shall be integral with each Hall Call Station with engraved / etched graphic.

Wexner Medical Center: Provide signs for firefighters' operation at designated fire floor, etched with the hall call station. Provide occupants signage at each floor with an etched graphic with the hall call station that says "Do Not Use Elevator In Case Of Fire" per elevator code.

- .12 Design the elevator main floor entrance with room for passengers to wait for the elevator out of the building's traffic flow. If the Elevators open into Fire resistance rated corridor (egress path) there shall be a lobby that completely separates elevators from the corridor by fire/smoke barriers and opening protection.
- .13 Design temperature and humidity conditioned airflow in front of the elevator doors.
- .14 Design adequate space between the elevator and the outside to allow moisture and dirt walk-off prior to elevator entry.
- .15 Design at least one elevator in each building to serve the mechanical equipment floor(s) and all other floors of the building.

Wexner Medical Center: The designated elevator shall be large enough to handle major pieces of equipment of the equipment room.

- .16 All elevators shall be numbered with a university customer number in addition to the State number. Customer number shall be supplied by Department's Elevator Manager.
- .17 ELEVATOR SELECTIVE COORDINATION REQUIREMENTS:
The following requirements take precedence over the requirements of "overcurrent protection" in Division 26 of BDS, for Low Voltage Distribution Systems.
 - a. Where more than one driving machine disconnecting means is fed by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated.
 - b. The A/E Engineer shall design main feeder, sub-feeder and branch circuit protective devices that are selectively coordinated for all values of overloads and short-circuits.
 - c. Elevator Circuits and disconnecting means shall have the following characteristics:

1. Be a listed device.
2. Capable of being locked in the open position.
3. Fusible switch or Circuit breaker.
 4. Have Shunt Trip capabilities.
- d. Prohibited Elevator Circuit Application: There shall be no running of multiple circuits to the Elevator Machine room, in an effort to bypass the selective coordination required by this standard.

Commentary: *Selective coordination for elevator overcurrent protective devices is a critical electrical circuit. The A/E shall not shift the responsibility of designing this circuit to the installing contractor with any other supply side overcurrent protective devices.*

- e. Elevator Overcurrent Protection shall be designed and be protected against overload and machine motors shall be rated as intermittent duty.
- .18 Car HVAC Equipment Disconnect.

14 20 03. GENERAL DESIGN AND PLANNING:

- .1 All components of the elevator system shall be manufactured by elevator manufacturers who are regularly engaged in the manufacture of elevator components; and all installations of elevator components shall be performed by Firms regularly engaged in installation, repair and maintenance of conveying systems.
- .2 ELEVATORS TYPE PREFERENCE: Electric overhead traction type elevators are preferred. Hydraulic, Holeless Hydraulic, in ground oil filled components shall comply with 14 20 02.10, and basement traction elevators may be considered for specific applications. The type of elevator required for a particular project shall be determined at the planning conference in consultation with the Department's Elevator Manager.
 - 2.1 PROHIBITED ELEVATORS TYPES: Machine-Room-Less (MRL) Elevator, roped hydraulic, telescoping, or inverted plunger assemblies shall not be permitted.

- .2.2 HYDRAULIC and ELECTRIC TRACTION ELEVATORS. The controllers shall utilize microprocessor based logic with control parameters fully field adjustable. Programmable chips shall be permanently programmed and shall not be affected by the loss of power or by spikes in the power system. The controller shall control the motor speed throughout the acceleration and deceleration to provide good floor approach and consistent stopping accuracy within gap limit allowed by the elevator codes. Controller shall control the high speed of the motor such that the performance time for up and down direction shall be similar. The controller's design shall be capable of controlling existing AC motors and/or new AC motors to provide the required RPM for the specified speed of the elevator. Controller shall maximize the use of solid state devices for reliability. Controller shall also provide for motor overload and overcurrent protection. The controllers shall be non-proprietary open market technology. Controllers shall have on board diagnostics with an integrated human interface system including monitor and keyboard. Controller manufacturers shall have ongoing and regular comprehensive factory training available to any licensed elevator mechanic and elevator contractor, to perform maintenance, repair and modernization of the equipment, and a full time, staffed call center for tech support. All replacement material must be supplied on a non-exchange basis. Controllers that require special diagnostic or adjusting tools/devices are prohibited.
- .2.2.1 Arrange equipment to provide ample room for servicing, repair, removal and maintenance.
- .2.2.2 Design hydraulic elevator machine room off a public area or maintenance room. The hydraulic machine room should not share a common wall with classrooms or offices. Design traction machine room to be accessible from a public corridor or maintenance room. The entrance should not be accessed through an office or restroom.

Wexner Medical Center: The hydraulic mechanical room should not share a common wall with patient care rooms, conference rooms, or offices. The entrance should not be

accessed through a patient care room or area, conference room, or office.

- .3 PROVISIONS FOR ADDITIONAL ELEVATORS WITHIN THE CURRENT STRUCTURE: Where multiple elevators are planned and some units are for future installation, or are specified as an alternate, group units together that are included in the base contract, with no vacant spaces between units. Provide hoisting beam in base contract for all future or alternate elevators.

- .4 DESIGN FOR MAXIMUM EFFICIENCY:

Wexner Medical Center: The hydraulic mechanical room should not share a common wall with patient care rooms, conference rooms, or offices. The entrance should not be accessed through a patient care room or area, conference room, or office.

- .4.1 Basement Traction Machine: Applications with heavy loads both weight and traffic count, which require a low building profile and minimized elevator overhead heights.
- .4.2 Overhead Traction Machine: Applications over four stops. Rise, speed, and heavy weight/traffic count, will dictate geared or gearless applications.
- .4.3 Provide the fastest speed/capacity as determined by the building structure.
- .5 EQUIPMENT SPECIFICATIONS: Including the following:
- a. Motors shall be AC by Imperial or Reuland.
 - b. Hostway doors, Car doors, and Cabs acceptable Manufacturers are: Gunderlin, Tyler, and H & B.
 - c. Wurtec Load weighers (<https://wurtec.com/products/17560>) HENNING RC-Series Permanent Overload “Donut” Sensors are capable of measuring absolute weight at each rope or belt, eliminating the need to calibrate with weights. The Plug’n Play sensors permanently install directly at the hitch point, under the spring/bushing assembly, and are ready for use after connection with the evaluation unit AE12 and the elevator controller. _

- d. Engrave: “WHEN FLASHING, CAR IS OVERLOADED”. The flashing light would be emanating from an overload sensing light or indicator mounted on the car control panel.
 - e. Isolation transformer shall be installed for each elevator.
 - f. Fixtures shall be GAL. Mfg. VPMC Series, vandal resistant. Hall Stations shall have engraved signage. Hall position indicators shall be installed at each floor and a Fire Command/Emergency power panel installed in the lobby/vestibule by the fire alarm remote annunciator. Department’s Elevator Manager will provide and approve templates for fixtures prior to fabrication.
 - g. Items to be sole-sourced are: Governors, Safeties, and Rope Grippers shall be Hollister Whitney. All roped elevators shall have a Hollister Whitney rope gripper installed, regardless of dual sheave brakes. Machine/Brakes, and sheaves shall be by Hollister Whitney or Imperial – Geared or Gearless. Ropes shall be Bethlehem.
- .5.1 ACCESS TO OVERHEAD SHEAVES for the lubrication and servicing. Specify cable self-oilers for traction elevators.
 - .5.2 All rotating equipment must be mounted on isolation pads.
 - .5.3 INSTALL ELECTRIC FEEDER PROTECTION including line filters with elevator controls.
 - .5.4 EMERGENCY OPERATION shall be specified per NFPA 72. All elevators in a bank should be sequenced to return to the main lobby, park with doors open. The next car would do the same automatically until the last car is landed at the lobby. A secondary landing shall be designated by the fire alarm system in case of fire at the lobby level.
Wexner Medical Center: An elevator consultant shall provide a recommendation on the number of elevators in each bank necessary to be on emergency power. The number of elevators in each bank on emergency power shall be a minimum of one.
 - .5.5 SEPARATE ELECTRIC SERVICE TO CONTROL SYSTEM by fused disconnect. Elevator lights and accessories will be on a separate fused disconnect and readily available to inside the door of the mechanical room.

- .5.6 **STUDS AND PROTECTIVE PADS:** Provide pad studs in all elevator cabs and one set of typical protective pads per project. Pads shall have rubber grommets.
- .5.7 For both new and remodeling installations, premium quality heavy duty door operators and track assemblies shall be specified to provide high performance operation.
- .5.8 Door equipment shall be GAL Mfg. Heavy Duty MOVFR with double spring sill closers.
- .5.9 Door panels shall be sandwich construction with 2 gibs per panel plus 1 fire gib.
- .5.10 **TRACKS AND ROLLER GUIDES:** All tracks shall be steel. All roller guides shall consist of three sound reducing wheels and shall be bearing steel with Dura bond LFX70 polyurethane tires. Precision type Roller guides shall be held in contact with the rail by means of adjustable devices. Roller guides shall run on dry unlubricated guide rails. Car rollers shall be a minimum of six inches in diameter. Counterweight rollers shall be a minimum of three inches in diameter.
 - .5.10.1 **GUIDE RAILS:** Use 'T' type guide rails for all car and counterweight guide rails.
 - .5.10.2 Roller Guides shall be ElSCO Heavy Duty Model A for cars guides and Model C for counterweight guides.
- .5.11 Elevator car doors are to be protected by full door infrared reversal devices with multiple beams that cover at least every six inch area of the opening.
 - .5.11.1 Door Reversal Device shall be Janus Panachrome.
- .5.12 **GUARDS FOR TOP OF CAR:** Where there is more than 12" of space between the car and the hoistway wall a 42" car top guard rail and a midrail at 21" are required.
- .5.13 **STAINLESS STEEL CAR DOOR** and frames.
- .5.14 **CEILING PANELS:** May or may not be required depending on location, if required for any location it will be determined during

planning conferences in consultation with Department's Elevator Manager.

- .5.15 FACTORY FINISHED HALL DOORS AND FRAMES: Color shall be stainless steel or as selected by the Architect/Engineer and approved by the University Architect.
- .5.16 HOISTWAY AND CAR SILLS: Sills shall be nickel silver. Install car sill extension to be flush with front returns.
- .5.17 FLOORING:
- Sub Flooring: Car sub floors shall have a metal pan lining with $\frac{3}{4}$ " APA Sanded Plywood Grade, APA A-C Plugged, Group 1, and fire retardant treated.
 - In general, elevator flooring shall comply with requirements found in Division 09, with the following additional requirements:
 1. Flooring materials shall be slip resistant compliant in accordance with OSHA and ADA Standards.
 2. Flooring material shall be a "no wax" material.
 3. All seams shall be "heat" or "cold" welded seams in accordance with manufacturing recommendations for warranty and durability compliance.
 4. Installed flooring material shall have a minimum of ten (10) year warranty for wear and durability.
 5. Installers shall be factory trained in installation, repair, and maintenance of said flooring material.
 6. A/E shall provide samples of the proposed flooring material to the Project Manager for approval by the Department's Elevator Manager prior to installation. (Examples of currently approved passenger elevator car flooring material should be similar to Norament Grano and Norament Round, by Nora System, Inc. and diamond plate for service / freight elevator cars.)
 7. The use of specialty flooring materials such as tile, marble, or carpet is discouraged. Proposed specifications for installation of these materials must be approved in advanced by the Department's Elevator Manager on a case by case basis only.
- .5.18 TELEPHONE SYSTEM: Furnish a vandal resistant telephone integral with car operating panel. Phone must be single button operation with

ring down circuit. No phone cabinets will be allowed. The phone wire to the elevator machine room will be a part of the travel cable. It is required that each car shall be equipped with an independent phone line. Phone shall be line powered only not capable of being programmed nor be equipped with timers or Batteries.

Commentary: Preferred Manufacturers are: Wurtec, EMS and Viking phones.

Wexner Medical Center: Connect to the OSUWMC telephone system for a fully functional system. Follow OSUWMC IS guidelines to make the final termination.

.5.18.1 Conduit and wiring from the Elevator Controller to the telephone backboard and Dual Wall Jacks for interfacing all other elevator equipment from the Controller shall be installed by the Electrical Contractor. Show location on drawings.

.5.18.2 Final connections to the elevator controller shall include pulling elevator wiring to remote junction box for final hook up in the Controller by the Elevator Contractor.

.5.18.3 Connect to the Campus telephone system with coordination with Office of Technology and Digital Innovation (OTDI), Wexner Medical Center-IT for a fully functional system. Follow (OTDI) guidelines to make the final termination to the telephone backboard. The travel cable shall have the necessary make-up and quantity for elevator operation plus 20% spares, plus 6 spare twisted, shielded communications wires (typically 20 awg). An additional separate (fire alarm) travel cable shall be installed and contain 8 pair twisted shielded 14 awg.

Wiring: The fire alarm wiring system shall be stranded copper, 75 degree C insulation, FPLP rated or Fiber Optic in some approved cases.

.5.19 **Wexner Medical Center ELEVATOR FINISHES:**

ELEVATOR CABS: All stainless steel finishes to be No. 4 satin.

Doors: Stainless steel.

Door Frames: Stainless steel.

Floor Finish: Carpet tile, see Interior Finish Schedule for approved manufacturer, type, and color.

Side and Rear Walls: Metal laminate.

Ceiling: Stainless steel with recessed LED downlights.

Base: Baked enamel on steel, recessed.

Front Return Panel: Same construction as doors.

Car Operating Panel: Integral with wall front return, one per car.

Hand Rail: Stainless steel, rear wall, continuous.

Door Threshold: Extruded aluminum.

HOISTWAY ENTRANCES: All stainless steel finishes to be No. 4 satin.

Frames: Stainless steel.

Doors: Stainless steel.

Sills: Extruded aluminum.

- .5.20 The following requirements shall be covered in The Elevator's Specifications:
 - .5.20.1 Interior car finishes (Walls, Handrails, Kick Plates, etc.)
 - .5.20.2 In Car Lighting (Normal and Emergency)
 - .5.20.3 Pit Lighting
 - .5.20.4 Machine Room Lighting
 - .5.20.5 Fixture Finishes (Stainless Steel, Vandal-Proof)

- .5.20.6 Operating Panel Requirements. The in car operating panel requirements shall be engraved with the building name, elevator number, elevator capacity, and fire fighter operation information for all University elevators.
- .5.20.7 Posting of Operating Certificate. The certificate shall be delivered to the Department's Elevator Manager. No certificate frames are to be provided.
- .5.20.8 Emergency Battery Type
- .5.20.9 Car Top Inspection Station
- .5.20.10 Car Ventilation
- .5.20.11 Install Fire Alarm speaker, provided by others, in elevator car, wired on a separate circuit.
- .5.20.12 **Wexner Medical Center: Consideration shall be given to the type and frequency of traffic on each elevator for heavy-duty car sills.**

.6 OPERATION:

- .6.1 CONTROLS FOR PERSONS WITH DISABILITIES: refer to Ohio Building Code, Chapter 11, ICC A117.1 and 2010 ADA Standard for Accessible Design, for specific requirements.
- .6.2 INDEPENDENT KEY CONTROL: Where elevators require key control, surface mount key switches are preferred. Security issues should be addressed thru programmable software. Cylinders for key operated devices shall be specified in the section entitled FINISH HARDWARE. Final keying will be determined by the University.
 - .6.2.1 Car Operating Panel-key switch hardware shall be Stanley Security Solutions Cylinder IE7 series and Stanley Security Solutions small format 7- pin interchangeable core for floor functions and Gem type FEOK1 for fire fighters' functions. Panel key switches may vary with user group.
- .6.3 Controllers shall be GAL Galaxy.

.6.4 SPECIAL REQUIREMENT:

.6.4.1 Specify as SAFETY MEASURE FOR TRACTION ELEVATORS, to be part of controller package, a circuit installed to detect the failure of the brake to lift. Detection of this failure shall be by means of mechanical switch and shall take the elevator out of service at the next stop and shall remain out of service until the condition is rectified.

.6.5 FIRE MARSHAL REQUIREMENTS:

- a. When emergency power is provided, the elevator(s) shall be tested under a full load on the generator. This shall include all emergency lighting and other emergency loads connected to the generator.
- b. Fireman's service shall be under emergency power condition.
- c. When Firemen's Service is provided, the Department's Elevator Manager and TSG shall be consulted as to which floors shall become priority 1 and priority 2 for emergency return situations.
- d. Provide the University's standard key security box near the entry used by first responders. The A/E, Consultant or Elevator Contractor shall provide elevator keys to the University's Department of Public Safety for placement in the key security box. Keys shall also be provided to the Department's Elevator Manager.

.6.6 Design solid state devices (SCR) Drive to reduce harmonic distortion to an acceptable level as described below.

.6.6.1 Silicon Controlled Rectifiers (SCR) Drive shall limit the total harmonic distortion (THD), especially THD reflected into the power system at motor speed of 50 to 100 percent (%) without substantial harmonic distortion anywhere in the system.

.6.6.2 Solid state devices or Silicon Controlled Rectifiers (SCR) Drive input voltage wave form or voltage distortion limits shall be less than 3% THD.

.6.6.3 Wave form distortion of the fundamental cycle can come from many sources (i.e. rotating machines, etc.). Therefore, it is required that the contractor measure reflected third harmonics (THD) after the startup of the system. Contractor shall provide

all the necessary instruments or tools required to accomplish this measurement without any additional cost to the University. This measurement shall be done in the presence of Ohio State Representative(s) from the Department's Elevator Manager.

.6.7 ELECTRICAL MAGNETIC FIELD INTERFERENCE (EMF) SHIELDING:

- .6.7.1 GENERAL:** Whenever elevator machine rooms/control rooms are adjacent to sensitive electrical equipment rooms (i.e. computer centers/rooms, elevator electronic control rooms) it is required that adjacent walls, floors or ceilings shall be shielded per Section 26 10 00 of this standard.

14 20 04. DESIGN FOR SPECIFIC INSTALLATIONS:

- .1 Freight Elevator Design/Selection:** If the elevator shall be used for carrying passengers and general freight, it shall be designed as a passenger elevator.
- .1.1 ELEVATORS FOR PARKING RAMPS AND OTHER OPEN STRUCTURES:** Elevators shall be designed in a sheltered area where rain and snow cannot reach any of the entrances directly. The elevator design shall provide for a protected area in front of the elevator doors to shelter people waiting for the elevator in inclement weather. Outdoor seasonal elevators shall be designed to provide removable exterior doors that will protect the elevator entrances and shaft from the penetration of water and snow. Outside doors will also eliminate off-season vandalism and increase safety from falls into the elevator shaft. Exclusion from the elevator by fencing or other method is preferred. Elevator shall be provided with:
- .1.2 HEAT AND AIR CONDITIONING IN EQUIPMENT ROOMS** to accommodate equipment. Provide heat and air conditioning to maintain adequate conditions per manufacturer requirements. Provide electrical heaters in hoistways to prevent condensation in the limit switches and ice in the door tracks.
- .1.3 HEAT IN ELEVATOR CAB** shall be in accordance with elevator code requirements.

- .1.4 AN EMERGENCY CALL BELL switch shall operate a bell in an occupied space. In some instance (i.e., parking ramp) a remote bell in another building may be required.
- 1.5 GLASS OBSERVATION ELEVATORS must have emergency power to operate a fan. Battery back-up shall be provided to maintain a minimum of four hours of exhaust fan operation.
- .2 ELEVATORS FOR MULTI-STORY BUILDINGS: In buildings requiring the use of automatic elevators, provide at least one elevator sized for evacuating people and for delivering firemen and equipment to a fire:
 - .2.1 The elevator car minimum clear dimensions shall be per 2010 ADA Standards for Accessible Design, Figure 407.4.1 Elevator Car Dimensions (a) and ASME A17.1 Standards. Elevator door shall be horizontal, sliding type to accommodate wheelchairs or an ambulance stretcher in its horizontal position.
- .3 The Architect/Engineer shall notify the University's Project Manager by letter prior to submission of schematic design documents for any of the following elevator types:
 - a. Glass walled observation elevators
 - b. Outside elevators
 - c. Outside seasonal elevators
 - d. Open air hoist ways
 - e. Escalator
 - f. Dumb Waiters
- .4 PROJECT COMPLETION: Project is complete when all specification items are completed to the satisfaction of the Department's Elevator Manager, and when the Elevator Contractor through the A/E has provided all closeout deliverables listed in this section to the Wexner Medical Center or FOD's Elevator Support Assistant Director Department's Elevator Manager or Student Life Director of Facilities Services. _

- .4.1 PROJECT CLOSEOUT: At the completion of the elevator project(s) A/E and Elevator Contractor shall provide the followings in conjunction with the university requirements and Standards:
- a. Training for Daily Operation shall include specifically one-half day (4hrs.) of on-site instruction for the operation of the equipment. The training shall be attended by the university's designated personal of the Department's Elevator Manager on the proper operation and maintenance of installed equipment prior to the university acceptance of elevator project as completed.
 - b. Closeout Deliverables
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- The "As-Built" Drawings and One-Line-Diagrams furnished shall present a clear view for use in maintaining proper operation and troubleshooting and repairs as needed. Final acceptance by the university shall be done in coordination with the University's Project Manager, manufacturer, consultant and University's Maintaining Authority.
 - One (1) hard copy (11" x 17") of the following:
 - All "As-Built" Drawings and One-Line-Diagrams of mechanical and electrical drawings,
 - One (1) Hard copy in a binder of the following:
 - Maintenance instructions, manufacturer's prescribed maintenance checklist and intervals of each maintenance task for installed equipment including, but not limited to, machine, motor, rope gripper, governor, recommended lubricants, parts manuals, etc. to permit maintenance of newly installed equipment.
 - One (1) electronic copy in a USB drive of the following:
 - All "As-Built" Drawings and One-Line-Diagrams of mechanical and electrical drawings. Maintenance instructions, manufacturer's prescribed maintenance checklist and intervals of each maintenance task for installed equipment including, but not limited to, machine, motor, rope gripper, governor, recommended lubricants, parts manuals, etc. to permit maintenance of newly installed equipment.
- Wexner Medical Center:**
- Two (2) hard copies (one set full size and one set half size) of the following:



- All “As-Built” Drawings and One-Line-Diagrams of mechanical and electrical drawings.
- Two (2) sets of hard copy in a binder of the following:
 - Maintenance instructions, manufacturer’s prescribed maintenance checklist and intervals of each maintenance task for installed equipment including, but not limited to, machine, motor, rope gripper, governor, recommended lubricants, parts manuals, etc. to permit maintenance of newly installed equipment.
- One (1) electronic copy in a USB drive of the following:
 - All “As-Build” Drawings and One-Line-Diagrams of mechanical and electrical drawings. Maintenance instructions, manufacturer’s prescribed maintenance checklist and intervals of each maintenance task for installed equipment including, but not limited to, machine, motor, rope gripper, governor, recommended lubricants, parts manuals, etc. to permit maintenance of newly installed equipment.
- c. Provide recommended lists of spare Parts, including specific items needed to support the new microprocessors and solid state speed control units.
- d. Provide wiring diagrams, technical manuals, and any diagnostic tools including operating and access codes incidental to the installation shall become the sole property of The Ohio State University and shall not be subject to any Manufacturer’s restrictions.

14 92 00. PNEUMATIC TUBE SYSTEMS:

Wexner Medical Center: SYSTEM ARCHITECTURE: The existing system consists of a 4” Swisslog CASIII System extended throughout the Doan, Rhodes, and James Cancer complex. In addition, there is a separate Swisslog CTS 6” TL 2005 System that extends throughout Ross Heart Hospital with branches to the Rhodes/Doan Hall labs and Emergency Department. Both front ends for the existing systems reside in Doan 009.

Wexner Medical Center: CASIII SYSTEM: Any addition or modification to the existing 4” system shall utilize latest release of electronics and communicate with the existing CASIII front end.



Most of the devices on the 4" system utilize emergency power. In order to strive for full functionality in an emergency situation, it is recommended that any new devices requiring an electric service utilize emergency power.

Wexner Medical Center: CTS 6" TL 2005 SYSTEM: All devices on this system are fed from emergency power enabling operation in emergency situations. In order to maintain consistency, any additions to the existing system shall utilize emergency power if an electrical service is required. Any extension of the existing 6" system shall be the Swisslog CTS 6" TL 2005 System. Any new system shall be Swisslog and communicate with the exiting front end.

END OF DIVISION 14 – CONVEYING SYSTEMS