# DIVISION H
# VERTICAL TRANSPORTATION REQUIREMENTS

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DIVISION H VERTICAL TRANSPORTATION

H.1  INTRODUCTION

Professionals will incorporate the following vertical transportation guidelines as applicable to the project’s requirements. Verify with the Project Manager the final Scope of Work.

H.2  GENERAL

A.  STANDARDS:  Elevator equipment specified will follow the design and manufacturing procedures in accordance with the International Organization for Standardization (ISO 9000 family of standards) to meet product and service requirements for quality assurance for new products.

B.  CODES:  Designs, unless specifically excepted, will be in accordance with the requirements of the ASME American Safety Code for Elevators and Escalators (ANSI A17.1), also referred to as the ASME Elevator Code A17.1 as adopted by the Commonwealth of Pennsylvania under the UCC code accepting all addendum up to 2002, the Commonwealth of Pennsylvania’s L&I Elevator Code, the Federal ADA Regulations and Design Standards, and Codes having legal jurisdiction in effect at the date of design completion.

C.  PAINTING:  Exposed metal work furnished under this specification will be, except where otherwise specified, properly painted, in accordance with the National Paint and Coatings Association by the Elevator Contractor. Existing metal parts, equipment, and concrete pit and maintenance room floors will be properly prepared and painted in accordance with paint manufacturer’s recommendations.

D.  TEMPORARY USE:  For modernization projects, a minimum of one (1) elevator will be fully operational at all times unless prior approval has been granted by the University.

E.  MAINTENANCE:  Elevators included in any new installation or major modernization project will receive regular full maintenance on each unit for a period of twelve (12) months in accordance with the University’s current service/maintenance agreement/specification from the date of warranty start. For major modernization projects, in addition to these twelve months, the Elevator Contractor will also provide maintenance from the date construction begins. The work to be performed consists of furnishing all material, labor, supervision, tools, and equipment necessary to provide full maintenance services and repairs of every description.

F.  WARRANTY:  Elevator Contractor will warrant that the work supplied will comply with the specifications and that there will be no defects in materials and workmanship for one year after the elevator inspector turns over all elevators in the project for use by the University. Elevator Contractor assumes complete responsibility under the warranty to provide a full service maintenance contract for all elevators in the project from the date construction begins until the end of the one year warranty period.
G. TESTS:

1. Elevator Contractor will perform tests specified and/or required by laws, rules, and regulations of all Departments having jurisdiction.

2. All parts of the work and associated equipment will be tested and adjusted to work properly and be left in perfect operating condition. Correct defects disclosed by these tests without any additional cost to the University. Repeat tests on repaired or replaced work if deemed necessary by the University.

3. Elevator Contractor will notify the University at least 72 hours in advance of tests. Furnish necessary instruments, gauges, and other equipment required for tests. Do not include expenses of Owner or his/her authorized representatives required to be present at such tests unless tests cannot be completed as scheduled. In the event of delay of tests after 72 hour notice had been given, or when such tests must be repeated, pay additional expenses incurred by Owner or his/her representatives, including cost of traveling, lodging, and meals. To avoid such occurrences, make preliminary tests prior to giving notice of final tests.

H. AS-BUILT DRAWINGS: Three (3) sets of mechanical, electrical, architectural, structural, fire protection, and control as-built drawings will be provided to the University’s Facilities Management Division by the Professional. One (1) set of drawings will be provided in electronic format.

I. SHOP DRAWINGS AND O&M MANUALS: Three (3) sets of as-built shop drawings and installation, operations, maintenance, and adjustment (O&M) manuals will be provided to the University’s Facilities Management Division by the Elevator Contractor. One (1) set will be provided in an electronic format. As-built shop drawings will show the complete elevator system and components, including project specific details of assembly, erection, anchorage, controls, wiring, and dimensions of hoistway and machine room. O&M manuals will include all project specific control schematics, wiring diagrams, software user manuals, maintenance and error code manuals, equipment user manuals, equipment catalog cuts, and spare part lists.

J. CONSTRUCTION SCHEDULE: For installations in new buildings, Elevator Contractor will supply elevators, escalators, mechanical and electrical equipment, hoistways, pits, and associated equipment or systems in a “punch ready” condition 30 days prior to the scheduled building completion date. Elevator Contractor will schedule a final inspection by the Commonwealth of Pennsylvania’s Department of Labor and Industry Elevator Division and the Local Fire Department ten (10) days prior to the scheduled building completion date.

K. CERTIFICATION OF ELEVATOR: During construction, if needed, the Elevator Contractor will certify through the Commonwealth of Pennsylvania a change in designation (e.g., passenger to passenger/freight) of an elevator during that period, and when construction is completed, the Elevator Contractor will recertify the elevator back to its original use.
H.3 PRODUCTS

A. Accepted Materials:

1. Materials and equipment will be new, of makes and kinds specified, or as indicated on the drawings, without exception. Where one brand, make of material, device, or equipment is specified or shown, the products of the manufacturers listed in “Accepted Manufacturers” will be regarded as acceptable when, in the opinion of the University, it is a recognized equal considering quality, workmanship, economy of operation, and suitability for the purpose intended.

2. Should bidders desire to install equipment and materials other than those included under “Accepted Manufacturers,” they will submit with their bid a rider listing the deductions or additions to the Contract for these substitutions. Said substitutions must be accepted in writing by the University, otherwise all materials and equipment must be according to plans and specifications.

3. Specifications will be based on the equipment and materials specifically designated. If it is elected to install material and equipment included under “Approved Materials”, or it is permitted to substitute other equipment, drawings will be submitted for approval showing changes required by this equipment or material and be responsible for its installation in the allotted space with proper clearances for servicing and repairing said equipment.

4. Where such accepted substitution or deviation requires a different quantity or arrangement of structural supports, wiring, or other equipment or accessories normal to this equipment, Elevator Contractor will furnish said changes and additions and pay all costs for changes to the work and the work of others affected by this substitution or deviation.

B. Accepted Manufacturers:

1. Materials will be in strict accordance with the quality, style, performance, and sizes specified. Manufacturer’s name or catalog numbers given in the specifications will be only for the purpose of establishing a standard of quality, style, size, and type and will not be construed to exclude equipment or material of other manufacturers. OEM proprietary equipment will be considered only if it meets or exceeds the quality, style, performance, and sizes specified of listed accepted manufacturers.

2. If OEM proprietary systems are submitted for approval, the OEM must provide all diagnostic tools (including those considered proprietary), software, hardware keys, SIM cards, prints, parts, wiring diagrams, manuals, etc. for the operation and maintenance of the systems to the University FM project manager at the time of shop drawing submission. Final payment will not be made until OEM provides all such items. The University agrees to sign a non-disclosure agreement for any proprietary software tools. The University also reserves
the right to share with all maintenance companies the proprietary software tools and will require them to sign non-disclosure agreements also.

3. When materials and equipment are purchased from the manufacturer specified or listed, Elevator Contractor will submit a complete verification specification with each copy of the shop drawings.

   a. Controllers
      
      1) Motion Control Engineering, Inc. (MCE, Inc.)
      2) Elevator Controls Corp. (ECC).

   b. Door Operating Equipment
      
      1) G.A.L. Manufacturing Corporation
      2) Moline Accessories Company (MAC).

   c. Door Detectors
      
      1) Janus Elevator Products, Inc. – Panaforty Plus

   d. Hoisting Motors (A.C.)
      
      1) The Imperial Electric Company
      2) Baldor Electric Company
      3) Reuland Electric Company
      4) Approved equal.

H.4 PASSENGER ELEVATORS

   A. Number: Sufficient to handle 12-15% of the total building population for office/library/garage/laboratory/dormitory and 25-40% of the total building population for classroom in a five minute “balanced up-down peak” period. Lobby waiting time will be designed to range between 0-20 seconds for classroom buildings, 25-35 seconds for office/library/laboratory/dormitory buildings, and 40-50 seconds for garage buildings with 80% of hall calls answered within the design interval and no greater than 2% of wait times exceeding 1.33 times the maximum interval for the specific building type. Projected occupancy will be verified with Facilities Management. The Professional will provide detailed calculations determining the quantity, speed, and capacity of elevators to be included in a building for University review.
B. Operation:

1. Furnish a group supervisory operation that is representative of the manufacturer’s most current “state of the art” technology. Solid state or rotating apparatus for field regulation is acceptable. Gearless electric traction elevators should be applied when total elevator travel exceeds 100 feet, with speeds beginning at 350 fpm. Rope compensation will be provided (for speeds under 500 fpm, encapsulated chain is acceptable). When total travel is less than 100 feet the Professional will determine the type of elevator to be utilized. In addition to group supervisory features, include the following:

   a. Anti-nuisance feature

   b. Automatic by-pass (set at 60-70% of capacity)

   c. Door detector including door nudging feature – Janus Panaforty Plus or Adams ICU Gatekeeper Plus

   d. Independent service feature

   e. Automatic self-leveling device

   f. Unintended car movement protection device

   g. Overspeed protection device

   h. Load weighing device with alarm

   i. ADA approved accessories

   j. Lobby traffic directors station (use when group exceeds 2 elevators) – includes monitor and locked panel with in-service switches, recall switches, and emergency power override switches (for buildings with four or more traction elevators, destination dispatching should be considered)

   k. Automatic emergency power provisions with manual override switches (note: emergency generators must have capacity to operate one elevator at a time--either passenger, freight, or combination passenger/freight--with the capability to operate any car at any given time; harmonic filters will be used on all motors with VFD or SCR drives; and generator sizing calculations will be done by the Professional and be provided to the University for review)

   l. Located within the car operating panel (COP) at ADA height, an emergency phone with pushbutton and speaker operation programmed to call the University of Pittsburgh Police Department and identify building and car

   m. Fire Fighter’s Service Phases I and II
n. Fire alarm tie-in and programming (identify make and model of the existing fire alarm system)

o. Raceway for teledata lines from nearest CSSD closet to the machine room for emergency phones and future elevator monitoring communications (Lift-Net™)

p. All keying consistent throughout an individual building and coordinated with the University

q. Add Alternate pricing for Lift-Net™ Micro Controller Machine Room Scanners tied into the existing Lift-Net monitoring system.

2. System for elevators will be arranged so that a passenger pressing the proper button in the car will register a call at the floor where a stop is desired. When a car is ready to leave a floor, automatic timing will cause the doors to close. When the interlock circuit is established and after the doors are closed, the elevator will accelerate to full speed; and when the car is at the proper distance from the first floor in sequence of stories for which either hall or car buttons have been pressed, the car will automatically decelerate and stop at the level of the floor landing.

3. Any corridor push buttons that have been operated will be connected so that calls from these buttons will be registered in all cars of the bank approaching the floor in the desired direction, and without any action whatever on the part of the passengers, the first car approaching the floor will automatically slow down and stop level with the floor and the doors will open, same as calls originating in the car.

4. A decentralized, multi-microcomputer based control system will be provided to perform all the functions of elevator group supervisory. The supervisory system for the passenger elevators will use the Peak/Clock Peak Traffic and Relative System Response criteria as the basis for all car-to-floor assignments under all traffic conditions. Cars will continuously “bid” for potential assignments to any hall call except during preset clock period. Microcomputers will be properly shielded from line pollution and will be designed to accept software reprogramming.

5. Provide a closed-loop, high-performance door operator with encoderless VVVF drive with the following features:

   a. Minimum ½ HP motor and heavy duty sprocket, chain, belt, and sheaves

   b. Closed loop regulated speed performance

   c. Hand-held keypad programming

   d. Adjustments can be stored in the keypad and downloaded to another operator

   e. Adjustable door obstruction reversal
f. Optical cams with LED indicators

g. Test switches for open, close, and nudging.

6. Provide each elevator with an accepted car leveling device provided by the control manufacturer that will automatically bring the car to a position level ±¼” with any floor, regardless of the load in the car or its direction of motion. The device will correct overtravel and undertravel as well as rope stretch due to variations of load. Correction will be in small steps without surges to eliminate tripping hazard.

7. Provide car door detector (door re-opening device). Provide sight guards as required.

a. The device will utilize infrared or ultrasonic beams to detect people or objects in the path of the closing doors. The device will be able to sense the presence of people or objects without physical contact.

b. The device will generate a curtain of beams, the full height of the opening.

8. Traveling cables will be new and be of the best grade for the service with adequate capacity for the functions and devices proposed and an additional 5% of spares. Furnish and install one new shielded cable dedicated to communications which will include a coaxial cable for each elevator. In addition, furnish and install one new four (4) conductor 18AWG overall shielded cable per landing and seven (7) new twisted 20AWG individually shielded pairs for future security use. The traveling cable wiring for future security will be run from the elevator controller/machine room and terminated in the phone/intercom box(es) in each of the cabs and will be properly tagged at each end. All traveling cables will be hung so that the proper size loop may be obtained. They will have a fire-resistant outer braid which will meet the underwriter’s standard tests.

9. Access limited to all or selected floors will be controlled through the use of a card swipe or proximity card reader installed within the cab’s COP. Should a passenger desire access to a controlled/secured floor, the elevator controller will sequence the following events:

a. Card is swiped

b. Floor selection is made by pushing floor button on COP (COP floor button will light indicating selected floor)

c. A dry contact closure signal is sent from the COP to the University’s security system (RS2 Technologies, LLC) for card and floor request verification (go/no-go)

d. If the security system denies the requested floor selection (no-go), the car remains at the floor landing with the elevator doors closed

e. If the security system accepts the requested floor selection, a dry contact closure signal is sent back to the COP (go to selected floor), the COP locks the selected floor request, the
request is registered, and the car travels to that floor only with normal arrival and arrival sequencing.

C. Configuration:

1. Arrange elevators in a common lobby with not more than four (4) in a line. Preferred arrangement: two (2) or more opposite each other to a maximum of four (4) on a side. Other arrangements may be dictated by the aesthetics of the building design. Where more than three (3) elevators are in a group, an additional pushbutton riser should be provided.

2. For buildings with 20 or more floors, consideration should be given to high-rise and low-rise banks of elevators. Minimum acceptable speed 350 fpm (4-10 floors), 500 fpm (11-19 floors), and 700 fpm (20 floors plus).

3. Design hoistways for elevator cars of “standard” industry dimensions, with width greater than depth and with center-opening doors, minimum of 3’ 6” clear opening.

D. Cab Finishes: Cab interiors will be designed to minimize the effects of vandalism. Provide operating panels with “hands-free” telephone console in compliance with the Federal ADA guidelines. Paint steel doors and frames. Provide stainless steel bar stock handrails to cab sides and back using concealed fastening.

1. Operating Panel and Telephone Console: Each car will have a stainless steel cab station containing a bank of vandal-proof illuminated stainless steel buttons marked to indicated floors served, a keyed emergency stop (variance required), call buttons, door open and close buttons, other keyed controls, etc. mounted accessible and marked in raised letters and Braille per ADA. ADA telephone/intercom console will be mounted integral to the operating panel/station. Each car station will have engraved fire service directions.

2. Lighting: Luminaires will be fluorescent or LED type consistent with University Standards and will be vandal-proof construction. Minimum illuminance level shall be 5 footcandles. Lighting controls shall be provided that turn off all car lighting when the car is not in use. For modernization projects, cut and patch ceiling/top of cab as required. An emergency luminaire will be provided in the front return with a 6”x2-1/2” high lens located approximately 70” above the finished floor.

3. Fans: Fans will be vandal-proof construction. For modernization projects, cut and patch ceiling/top of cab as required.

4. Emergency stop switch: An emergency stop switch with audible alarm will be provided to meet ANSI A17.1 Code requirements.

E. Submissions and Approvals: The following are items to be submitted for approval to Facilities Management:
1. Copy of the “two-way balanced” traffic analysis.

2. A recommendation (include capacity, speed, and type) of supervisory system to be use in the project.

3. Hall and car call button design – catalog and drawings.

4. Cab interior design drawings.

5. By the Professional, demand load analysis for the normal power source(s) and generator sizing calculations for the emergency power source(s) to confirm that the electrical systems are adequate for the non-linear elevator controller loads.

H.5 FREIGHT AND COMBINATION PASSENGER/FREIGHT ELEVATORS

A. Number: In general, a minimum of one (1) freight or combination passenger/freight elevator should be provided irrespective of building size (swing service cars should be considered in residence halls of five or more stories).

B. Operation:

1. Motor and generators should be sized to ensure that they handle specified capacity and are not at the marginal cut-off point of the intended application. Gearless electric traction machines should be applied when total elevator travel exceeds 100 feet, with a rated speed of 350 fpm. When travel is less than 100 feet the Professional will determine the type of elevator to be utilized. Include the following:

   a. Dual light ray or solid state door detection devices

   b. Automatic emergency power operation with manual override

   c. Attendant or independent service capability

   d. Automatic self-leveling device

   e. Load weighing device with alarm

   f. Overspeed protection device

   g. Unintended car movement protection device

   h. Corridor position indicators – located above entryway at heavy traffic floors; i.e., kitchen, loading dock, basement level.

   i. “Vandal resistant” fixtures for car and hall (directional lanterns included)

   j. Emergency phone with pushbutton and speaker operation located within COP at ADA height
k. Fire Fighter’s Service Phases I and II

l. Fire alarm tie-in and programming.

2. The system for elevators will be arranged so that a passenger pressing the proper button in the car will register a call at the floor where a stop is desired. When a car is ready to leave a floor, automatic timing will cause the doors to close. When the interlock circuit is established and after the doors are closed, the elevator will accelerate to full speed; and when the car is at the proper distance from the first floor in sequence of stories for which either hall or car buttons have been pressed, the car will automatically decelerate and stop at the level of the floor landing.

3. Any corridor push buttons that have been operated will be connected so that calls from these buttons will be registered in all cars of the bank approaching the floor in the desired direction, and without any action whatever on the part of the passengers, the first car approaching the floor will automatically slow down and stop level with the floor and the doors will open, same as calls originating in the car.

4. Combination passenger/freight door operation should be governed by a master gearless door operator mechanism. Door openings will have a minimum width of 4’ 0” and height of 7’0” with two-speed side opening arrangement. Doors will have a full cycle time of 10.8 seconds or less taken from “door start to close” at one floor to “door open” fully at next floor, assuming a 12’0” run.

5. For freight-only elevators, power bi-parting doors and gate should be utilized, unless exposed to extreme temperature conditions or the total landings served do not exceed three (3).

6. Provide each elevator with an accepted car leveling device provided by the control manufacturer that will automatically bring the car to a position level ±¼” with any floor, regardless of the load in the car or its direction of motion. The device will correct over-travel and under-travel as well as rope stretch due to variations of load. Correction will be in small steps without surges to eliminate tripping hazard.

7. Provide car door detectors (door re-opening device) of the non-retractable, proximity type. Provide sight guards as required.

   a. The device will utilize infrared or ultrasonic beams to detect people or objects in the path of the closing doors. The device will be able to sense the presence of people or objects without physical contact.

   b. The device will generate a curtain of beams, the full height of the opening.

8. Traveling cables will be new and be of the best grade for the service with adequate capacity for the functions and devices proposed and an additional 5% of spares. Furnish and install one new shielded cable dedicated to communications which will include a coaxial cable for
each elevator. In addition, furnish and install one new four (4) conductor 18AWG overall shielded cable per landing and seven (7) new twisted 20AWG individually shielded pairs for future security use. The traveling cable wiring for future security will be run from the elevator controller/machine room and terminated in the phone/intercom box(es) in each of the cabs and will be properly tagged at each end. All traveling cables will be hung so that the proper size loop may be obtained. They will have a fire-resistant outer braid which will meet the underwriter’s standard tests.

9. Access limited to all or selected floors will be controlled through the use of a card swipe or proximity card reader installed within the cab’s COP. Should a passenger desire access to a controlled/secured floor, the elevator controller will sequence the following events:

a. Card is swiped

b. Floor selection is made by pushing floor button on COP (COP floor button will light indicating selected floor)

c. A dry contact closure signal is sent from the COP to the University’s security system (RS2 Technologies, LLC) for card and floor request verification (go/no-go)

d. If the security system denies the requested floor selection (no-go), the car remains at the floor landing with the elevator doors closed

e. If the security system accepts the requested floor selection, a dry contact closure signal is sent back to the COP (go to selected floor), the COP locks the selected floor request, the request is registered, and the car travels to that floor only with normal arrival and arrival sequencing.

C. Configuration

1. Arrange elevators in a common lobby with no more than four (4) in a line. Preferred arrangement: two (2) or more opposite each other to a maximum of four (4) on a side. Other arrangements may be dictated by the aesthetics of the building design.

2. For buildings with 20 or more floors, consideration should be given to high-rise and low-rise freight or combination passenger/freight elevators. Minimum acceptable speed 250 fpm (4-12 floors), 350 fpm (13-19 floors), and 500 fpm (20 floors plus).

3. Design hoistways for elevator cars of “standard” industry dimensions, with depth greater than width and with two-speed side opening. Minimum door opening clearance will be 4’ 0”.

4. A minimum of one (1) combination passenger/freight elevator will have a net inside clear height of 10’ 0”.

D. Generally, freight enclosures will conform to the manufacturer’s “standard” design.
E. Freight elevators should be evaluated based upon intended load capacity. Except in special applications and then only with University approval, utilize Class A loading, where the rated load will be based on not less than 49 lb/ft² of inside net platform area. Floors will be heavily reinforced and overclad with diamond check plate sheet steel material.

F. For elevators with passenger use, supply an emergency phone with pushbutton and speaker operation located within COP at ADA height. Phone will be programmed to call the University of Pittsburgh Police Department and identify building and car

G. Cab Finishes

1. Wall surfaces, entrance returns, and car door surfaces will be “rigidized” type or equal. Entrance frames will be clad 7’0” up from the floor with a stainless steel mop strip. Cabs will be equipped with a double “cart crash” railing with a minimum height of 6” for lower railing and 33” for upper railing securely fastened to side and rear walls. Wall panels below the lower railing shall be easily replaceable without removing the railing.

2. Flooring will be 1/8” diamond plate stainless steel or approved equal material. Professionals will coordinate finished floor surface with Facilities Management.

3. Luminaires will be fluorescent or LED type consistent with University Standards and will be vandal-proof construction. Minimum illuminance level shall be 5 footcandles. Lighting controls shall be provided that turn off all car lighting when the car is not in use.

H. Submissions and approvals: The following items are to be submitted for approval by Facilities Management.

1. Hall and car call button design – catalog

2. Corridor signal fixture design

3. Cab interior design drawings

4. By the Professional, demand load analysis for the normal power source(s) and generator sizing calculations for the emergency power source(s) to confirm that the electrical systems are adequate for the non-linear elevator controller loads.

H.6 ESCALATORS

A. Escalators are prohibited unless requested specifically by the University.

B. Sizing of escalator units will be based upon projected peak traffic movement – typically use 48” unit from lobby to second floor level and reduce to 32” unit as successive floors typically yield less traffic.
C. Escalators with opaque balustrade and rounded newel design should be used in open visible spaces. Decks, skirts, and other finishes should match lobby area.

D. Equip all escalators with under-step lighting and controlled stop braking.

END OF DIVISION