To: **Designers For State Owned Projects**

From: **NC Department Of Labor, Elevator Bureau**

Subject: **Geared Traction Passenger Elevator Specification Guide Information/Instructions**

The attached **Elevator Specification Guide(s)** will be required to be used when **elevator approval** is required during the design process for **State Owned Buildings**.

Special attention and selection is required using the elevator guide(s) where items appear in **BOLD** or **[BRACKETS]. SELECT** and/or **EDIT** these items.

Where **SELECTIONS** are given, **Select** those applicable and **Delete** those not applicable.

Requirements may be **added** or **expanded** under **OTHERS [ ]. Delete** if not used.

Hydraulic Elevators ONLY: Due to the various **Types of Hydraulic Elevators,** particular attention is required in **2.02 A, paragraph 4 Type. Selection** is required in **[Arrangement #1 - #4]**. It is recommended that professional guidance be obtained in selecting the most practical application for the project(s). This guidance can be obtained from either elevator companies and/or elevator consultants.

Note in **2.02 A, paragraph 7 Rise,** that the various arrangements are limited to the **rise in feet**.

During the design process, provide us with a section drawing through the elevator hoistway(s) including dimensions. Show the pit depth, pit access ladder(s), clear overhead, including overhead hoisting or machine beams, hoistway ventilation and any other information necessary for a complete elevator installation.

The following four (4) pages include a list of code requirement most frequently asked by Designers and Contractors. Do not include these pages in the elevator specifications.

The **Elevator Specification Guide(s)** are also available in electronic format.

Should you have any questions, we can be reached at (919) 807-2770.

1 - The minimum size **pre-engineered passenger elevator** for buildings **less than four stories** is:

Capacity: 2000 pounds, Clear car size 5'8" wide x 4'3" deep, Single-slide door 3'0" wide x 7'0"high.

Four or more stories:

Capacity: 2500 pounds, Clear car size 6'8" wide x 4'3" deep, Single- slide door 3'6" wide x 7'0" high.

See NC State Building Code, Volume 1, Chapter 30, 3002.4. Elevator car to accommodate ambulance stretcher.

2 - Hoistway (shaft) enclosures shall have a fire-resistance rating of not less than **2 hours** where connecting **four** stories or more and **1 hour** when connecting **less than four stories**.
See NCBC Vol. 1, 707.4.

3 - Machine rooms and machinery spaces shall be enclosed with construction having a fire-resistance rating **not less than the required rating of the hoistway enclosure** served by the machinery.
See NCBC Vol. 1, 3006.4.

4 - Openings shall be protected with assemblies having a fire-resistance rating **not less** than that required for the hoistway enclosure doors.
See NCBC Vol. 1, 3006.4.

5 - **Opening protective** (hoistway & machine room doors) with shaft enclosures having a fire-resistance rating **greater than 1 hour is 1½ hours**, shaft enclosures of **1 hour is a 1 hour opening protection**.
See NCBC Vol. 1, Table 714.2.

6 - Hoistway ventilation is required for elevators penetrating **more than three stories.**
See NCBC Vol. 1, 3004.

7 - Hoistways or elevator machine rooms protected with automatic sprinklers shall be provided to **disconnect automatically the main power supply** to the affected elevator upon and prior to the application of water.
See NCBC Vol. 1, 3006.5.

8 - Beams, floor slabs or other building construction shall not project more than **100mm (4")** inside the elevator enclosure unless the top surface of the projection is beveled at an angle of not less than 75º with the horizontal. Same requirement applies for setbacks exceeding **100mm (4")**.
See ANSI A17.1, 2.1.6.2.

9 - Access doors to machine rooms and overhead machinery spaces shall be a minimum width of 750mm (29.5") and a minimum height of 2,030mm (80"). Access doors shall be self-closing and self-locking, be provided with a spring-type lock arranged to permit the doors to be opened from the inside without a key.
See ANSI A17.1, 2.7.3.4.

10 - A **drain or sump pump** shall be provided in elevator pits. The cover shall be secured and level with the pit floor. The requirements of the NC State Plumbing Code shall apply. They shall be provided with a positive means to prevent water, gases, and odors from entering the hoistway.
See ANSI A17.1, 2.2.2.4.

11 - Illumination (minimum) required for:

Elevator pits - 100 lx (10 fc) at pit floor.

Elevator Machine Rooms and Machinery Spaces - 200 lx (19 fc) at the floor level.

12 - **Temperature and Humidity** – Machine rooms shall be provided with natural or mechanical means to keep the ambient air temperature and humidity in the range specified by the elevator manufacturer to ensure safe and normal operation of the elevator. The temperature and humidity range shall be permanently posted in the machine room.
See ANSI A17.1, 2.7.5.2.

Note: Most elevator manufacturers require a temperature range of 65 – 90 F.

13 - Safe and convenient access shall be provided to **all pits**. Provide a pit ladder for **each** elevator pit. Ladder shall extend not less than **1200mm (48")** above the sill of the access door.
See ANSI A17.1, 2.2.4

See ANSI A17.1, 2.7.3 for access to machine rooms and machinery spaces.

14 - Access to the roof level from the top level shall be provided with a **stairway with a swinging door and platform**. Hatch covers, as a means of access to roofs, shall not be permitted.
See ANSI A17.1, 2.7.3.2.1. through 2.7.3.3.5.

15 - Elevator machine rooms shall have a clear overhead of **not less than 2,130mm (84")**.
See ANSI A17.1, 2.7.4.

16 - Only such items that pertain to the elevator are allowed in elevator machine rooms and elevator hoistways. This should be noted on the Electrical, Mechanical and Plumbing plans.
See ANSI A17.1, 2.7.2 and 2.8.1.2

17 - Air conditioning equipment shall **not** be located directly above elevator equipment, in the elevator machine room.
See ANSI A17.1, 2.8.4.1 through 2.8.4.5.

18 - Machine rooms shall be designed of sufficient size to provide a clear path of not less than 450mm (18") to all elevator components that require maintenance.
See ANSI A17.1, 2.7.2.2.

Note: In addition, NFPA 70 – National Electrical Code, requires a minimum clear distance of 900mm (3') to 1.2m (4') working space in the direction of live parts. See table 110.26 (A)(1).

19 - Provide an elevator cab telephone circuit to **each** elevator. Pipe and wire circuit(s) to elevator controllers located in the elevator machine room(s).

20 - Fire alarm initiating devices shall be provided at **each floor** served by the elevator, in the associated elevator machine room, and in the elevator hoistway, when required.
See ANSI A17.1, 2.27.3.2.1 and NFPA 72.

21 - When sprinklers are provided in elevator machine rooms, machinery spaces, and hoistways, means shall be provided to automatically disconnect the main power supply to the affected elevator upon or prior to the application of water.
See ANSI A17.1, 2.8.2.3.2 and NFPA 13.

22 - When sprinklers are installed in the hoistway, all electrical equipment located **less than 1225mm (48")** above the pit floor shall be weatherproof (NEMA 4), and wiring shall be identified for use in wet locations in accordance with the requirements of NFPA 70.
See ANSI A17.1, 2.8.2.3.4.

23 - A single means shall be provided for disconnecting all underground main power supply conductors for each elevator, located in the elevator machine room(s). **The disconnecting means** shall be an enclosed externally operable fused motor circuit switch or circuit breaker capable of being locked in the open position.
See NFPA 70, Article 620-51.

24 - A separate branch circuit for each elevator shall supply the car lights, receptacle(s), auxiliary lighting power source, and ventilation on each elevator car. The over current device (same requirements as #23) protecting the branch circuit, shall be located in the elevator machine room.
See NFPA 70, Article 620-22 and Article 620-53.

25 - Ground-fault circuit-interrupter protection (GFCI) for personnel shall be provided for each 125-volt, single-phase, 15 and 20 ampere receptacles in each machine room and machinery space.
See NFPA 70, Article 620-85.

26 - Provide same as #25 above in each **pit**, **hoistway**, and **elevator car top**, **except** receptacles shall be of the ground-fault circuit-interrupter **(GFCI) type**.
See NFPA 70, Article 620-85.

DESIGNERS SPECIFICATION GUIDE

GEARED TRACTION ELEVATORS

Part 1 – General

1.01 Description of Work and References

A. This Section covers and includes the furnishing and installing of passenger geared traction elevator equipment as hereinafter described.

B. All terms of this specification shall have their meaning defined in the American Society of Mechanical Engineers A17.1 Safety Code for Elevators and Escalators and hereinafter referred to as ANSI A17.1 Code, including all revisions and authorized changes to date.

C. All work shall be performed in a first-quality manner and is to include all work and material in accordance with the drawings and as specified herein.

D. In all cases where a device or part of the equipment is herein referred to as a single component, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

E. All work shall be performed in accordance with the latest revised edition of the American Society of Mechanical Engineers ASME/ANSI A17.1 Safety Code for Elevators and Escalators, the National Electrical Code and N. C. State Building Code(s) and other required codes that are applicable. Additional payments or changes in the contract work by the contractor are to be accomplished by a properly executed change order. This process must be in accordance with the North Carolina Construction Manual.

1.02 Related Work By Others

A. General contractor shall provide the following in accordance with the requirements of the ANSI A17.1 Code, NC State Building Codes, NFPA 70 National Electrical Code and other required codes.

1. A properly framed clear, plumb hoistway with variations not to exceed ½" at any point, including adequate guards and protection of hoistway during the erection period.

2. Access to the machine room and machinery space as required by the ANSI A17.1 Code and NC State Building Code.

3. Legal size machine room with ventilation and temperature to be maintained between 65° -90° F. Consult elevator contractor to verify this temperature range.

4. Projections, recesses and setbacks in hoistway enclosures exceeding 4" shall be beveled at an angle not less than 75° with the horizontal.

5. Supports for rail brackets at pit, each floor and roof. Maximum allowable vertical spacing of rail supports, without backing. Divider beams between hoistway at each floor and roof, for guide rail bracket support.

6. Light and convenience outlets (GFCI) in machine room with light switches located within 18" of lock jamb side of machine room door.

7. A fused disconnect for the main power supply conductors for each elevator as per the NFPA 70, NEC, Article 620-51.

8. A separate branch circuit with fused disconnect switch in the machine room for each elevator car lighting power source.

9. A separate branch circuit for elevator signal circuit, when required by the elevator control system.

10. Convenience outlet (GFCI) and a minimum of two light fixtures per elevator located in elevator pit. Locate pit light switch adjacent to the pit access ladder(s) 48" above the lowest landing hoistway entrance sill.

11. Provide a vertical iron ladder for access to each elevator pit. Extend pit ladder a minimum of 48" above the lowest landing hoistway entrance sill. Consult elevator contractor for location.

12. Provide ventilation of the hoistway as required by the NC State Building Code.

13. Recesses, supports and patching, as required to accommodate hall button boxes, signal fixtures, etc.

14. Provide a dry waterproof pit reinforced to sustain vertical forces on car rails and impact loads from car buffers.

15. Front entrance partition walls to be constructed after door frames and sills are set in place. If entrance walls are poured concrete bearing walls, rough openings are to be provided to accept entrance frames and filled in after frames are set.

16. Level surface of finish floor at each landing to be continuous for full width of hoistway. Adequate support or sill angle across full width of hoistway at each landing. Vertical surface of entrance sill support to be plumb, one above the other, and square with the hoistway. Grout, if required, between door frames to sill line to provide a smooth level surface.

17. Any cutting, patching and painting of walls, floors or partitions.

18. Electric power for lights, tools, hoist, etc., during erection as well as required power for installing, testing and adjustment of the elevator.

19. Fire recall initiating devices (smoke, heat, etc.) or products of combustion sensing devices connected to elevator machine room controller terminals. Provide fire alarm panel as required.

20. Requirements for elevators, if emergency power is provided, as per the ANSI A17.1 Code and NC State Building Code.

21. Telephone line wiring routed to elevator controller for each elevator cab.

22. Class "ABC" fire extinguishers provided in electrical machinery and control spaces. Locate convenient to the access door.

23. Pit drain or sump pump for elevator pits. Cover shall be secure and level with pit floor.

1.03 Quality Assurance

A. In the interest of unified responsibility, the elevator contractors shall be one regularly engaged in the business of installing and servicing of the type and character required by these specifications.

1. The contractor shall have technical qualifications of at least five years experience, trained supervisory and installation personnel, and facilities to install specified items.

2. Any manufacturer's product submitted shall have been in satisfactory and efficient operation on not less than twenty-five installations similar to this project and for not less than one and one-half years. Contractor shall submit a list of installations, including names and addresses to the Designer for approval, as per the North Carolina Construction Manual, General Conditions of the Contract, Article 16.

3. There shall be a permanent service organization maintained or trained by contractor which will render satisfactory service to this installation within two hours of receipt of notification that service is needed. Submit name and address of service organization.

B. All designs, clearances, construction, workmanship and material shall be in accordance with the ANSI A17.1 Code, NC State Building Codes, NFPA 70 National Electrical Code and all codes having legal jurisdiction.

C. The major elevator components shall be the products of one manufacturer of established reputation, except they may be the products, either wholly or in part,

of another manufacturer of established reputation provided such items are engineered and produced under coordinated specifications. Any contractor who proposes to install any **major elevator component** not manufactured or normally assembled by him, as part of his equipment, shall have such product approved by the North Carolina Department of Labor, Elevator Bureau, prior to bidding this specification. Also, the major components to be furnished shall be of a make or makes that have performed satisfactorily together under conditions of normal use in not less than twenty-five other elevator installations of equal or greater capacity and speed for a minimum of one and one-half years within the United States, and a minimum of three installations in North Carolina. Upon request the names and addresses of the building and the names of the owners or managers thereof, in which the proposed combination of major components has so performed, shall be furnished.

1. The term **major elevator components** as mentioned above shall mean such items as the machine, brake, motor, controllers, door operator and control equipment.

2. The machine and associated control system shall be mounted in the elevator machine room. Equipment shall be so arranged that parts can be removed for repairs or replacement by conventional means, without dismantling or removing other equipment components in the machine room. Adequate work space for maintenance and repair operations shall be provided around the elevator equipment in the machine room with clear passage to any access or trap doors.

1.04 Submittals

A. The elevator contractor shall, after structural and architectural drawings are furnished, submit complete working drawings, showing the location of all equipment, loads, and all other information necessary to render a totally functional elevator.

B. The elevator contractor shall provide finish samples upon request, and cab entrance and fixture cutsheets.

C. The elevator contractor shall provide two complete sets of electrical and solid state wiring diagrams, operating and maintenance manuals. These shall include:

1. Description of the elevator system's sequence of operation and control including the functions of signals, door devices and other features;

2. Written instructions for the trouble-shooting, adjustment and care of the entire equipment;

3. Electrical prints shall be reproducible type, non-fading;

4. One set shall be sealed in a clear material and mounted in the elevator machine room;

5. All electrical wiring diagrams shall be **as built** drawings. If standard drawings are used they shall be marked up according to the installation for which they apply;

6. The identification label for each diagram and manual shall include the subject, building name, location, contract number, and the specified state assigned elevator number to which the diagrams and manuals apply;

7. One set of diagrams and manuals shall be delivered to the Designer who will deliver them to the engineering officer of the facility; and

8. The elevator contractor shall notify the North Carolina Department of Labor for scheduling of a final inspection as per code and specifications. Approval must be given that all code requirements have been met and that installation complies with the specifications before final payment will be made.

9. Tools, programmers, laptops, etc. necessary to maintain and/or trouble-shoot the elevator system shall be furnished to the owner. Provide instructions manuals, etc., in the operation of these special tools.

1.05 Temporary Use

A. Should the service of an elevator be required before completion and final acceptance, permission in writing must first be obtained for the Designer. In addition, the user shall sign the elevator contractors temporary acceptance form and be bound by the terms and conditions.

1.06 Delivery, Storage and Handling

A. A dry and protected area, conveniently located to the elevator hoistway will be assigned to the elevator contractor without cost for storage of his materials and tools.

B. Should the building or site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor shall provide a proper and suitable storage area on or off the premises.

1.07 Warranty

A. The elevator contractor shall guarantee the materials and workmanship against defect due to faulty materials or faulty workmanship or negligence for a period of twelve (12) months following the final acceptance of the work.

Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective materials, equipment, or workmanship without cost to the owner within the stipulated guarantee period.

This warranty is not intended to supplement normal maintenance service and shall not be construed to mean the elevator contractor will provide free service for periodic examination, lubrication, or adjustment due to normal use, beyond that included in the specifications; nor will the elevator contractor correct, without charge, breakage maladjustments or other trouble arising from abuse, misuses, or improper use of the equipment, which may develop within twelve (12) months from the date of acceptance.

1.08 Maintenance

A. Maintenance Service: The elevator contractor shall furnish an all-inclusive first-quality maintenance and call-back service on each elevator after it is completed and placed in operation for a period of twelve (12) months, concurrent with warranty period. This service shall consist of examinations of the equipment at a minimum of once a month. Service shall include adjustments, lubrication, cleaning, supplies and parts to keep the equipment in proper operation, except for such adjustments, replacement of parts or repairs made necessary by abuse, misuse or any other causes beyond the control of the elevator contractor. All work will be done by trained employees of the elevator contractor during regular working hours of the trade. Emergency call-back service shall be provided at no cost to the owner and included for all hours and days during the maintenance period.

1. Thirty days before expiration of the twelve (12) month maintenance service, the elevator contractor shall schedule an inspection of the elevator equipment with the Owner or his representative. This inspection is to assure that the elevator equipment is in safe first-quality, operating condition and the equipment is operating in line with its original design. An authorized representative of the elevator contractor shall accompany the Owner or his representative.

B. Examinations and log: During the warranty maintenance period the elevator contractor shall maintain maintenance records as per ANSI A17.1 Code for each elevator. The records shall be located in the elevator machine room and be used to indicate all call backs, repairs, replacement of parts, fire service test and adjustments performed by the mechanic. Each entry in the maintenance records shall be signed by the mechanic who performs the work and be kept up-to-date at all times.

1.09 Painting – Equipment / Floors

A. All exposed metal work and equipment furnished by the elevator contractor under these specifications shall be properly painted after installation in order to present a new appearance, as otherwise specified.

1. Minimum requirements shall include one coat of metal primer, and one coat of semi-gloss industrial grade enamel.

2. All surfaces painted must be clean and free from rust, oil, grease, etc., before painting.

3. Machine room floors and pit floors shall be cleaned and painted with two coats of semi-gloss industrial grade enamel.

Part 2 – Products/Operations

2.01 Acceptable Manufacturers

A. Subject to compliance with requirements, provide products of one of the following manufacturers, or approved equal:

1 – Otis Elevator Corporation
2 – Schindler Elevator Corporation
3 – Kone Elevator Corporation
4 – Thyssen Krupp Elevator Corporation

[Note: Select (Edit) items shown in [Bold] text]

2.02 System Description: Elevator Arrangement

A. Elevator Equipment Summary

1 – Building: **[Enter Name]**

2 – Location: **[Enter Address]**

3 – Quantity of Passenger Elevators: **[Enter appropriate number]**

4 – Type: Geared Traction Elevator with variable voltage variable frequency A.C. Drive. Machine located above hoistway.

OTHER – [ ]

5 – Number of Stops: **[Enter appropriate number, 15 maximum]**

6 – Number of Openings: **[Enter #]** at front, **[Enter #]** at rear

7 – Rise: **[Enter appropriate number, 150 ft. (maximum) 45.72 meters].**

Roping**: [Select <1:1> or <2:1>]**

8 – Rated Capacity/Speed:

[Select one of the following capacity/speed combinations:]

[Front and glassback cab opening capacities and speeds].

2500 pounds, 350/400/450/500 fpm (1134 kg, 1.78/2.03/2.29/2.54 m/sec)
3000 pounds, 350/400/450/500 fpm (1361 kg, 1.78/2.03/2.29/2.54 m/sec)
3500 pounds, 350/400/450/500 fpm (1588 kg, 1.78/2.03/2.29/2.54 m/sec)
4000 pounds, 350 fpm (1818 kg, 1.78 m/sec)
4500 pounds, 350 fpm (2041 kg, 1.78 m/sec)
5000 pounds, 350 fpm (2770 kg, 1.78 m/sec)

[Front & Rear Opening Capacities & Speeds]

2500 pounds, 350/400/450/500 fpm (1134 kg, 1.78/2.03/2.29/2.54 m/sec)
3000 pounds, 350/400/450/500 fpm (1361 kg, 1.78/2.03/2.29/2.54 m/sec)
3500 pounds, 350/400/450/500 fpm (1588 kg, 1.78/2.03/2.29/2.54 m/sec)
4000 pounds, 350 fpm (1818 kg, 1.78 m/sec)
4500 pounds, 350 fpm (2041 kg, 1.78 m/sec)
5000 pounds, 350 fpm (2270 kg, 1.78 m/sec)

OTHER – [ ]

9 – Minimum Car Inside: [**Match to appropriate capacity selected above]**

[Front Opening and Glassback]

[2500 #] 6’8” wide x 4’3” deep (2032mm x 1295mm)
[3000 #] 6’8” wide x 4’9” deep (2032mm x 1448mm)
[3500 #] 6’8” wide x 5’5” deep (2032mm x 1651mm)
[4000 #] 7’8” wide x 5’5” deep (2337mm x 1651mm)
[4500 #] 5’8” wide x 7’11” deep (1727mm x 2413mm)
[5000 #] 5’11” wide x 8’6” deep (1803mm x 2591mm)

OTHER – [ ]

[Front & Rear Opening]

[2500 #] 6’8” wide x 4’3¾” deep (2032mm x 1315mm)
[3000 #] 6’8” wide x 4’9¾” deep (2032mm x 1467mm)
[3500 #] 6’8” wide x 5’5¾” deep (2032mm x 1670mm)
[4000 #] 7’8” wide x 5’5¾” deep (2337mm x 1670mm)
[4500 #] 5’8” wide x 7’11¾” deep (1727mm x 2432mm)
[5000 #] 5’11” wide x 8’6:” deep (1803mm x 2610mm)

OTHER – [ ]

10 – Inside Cab Height: **[Select Appropriate]**

8’0” (2438mm) [**or]** 9’7” (2,921mm)

Height Under Ceiling: **[Select Appropriate]**

7’3½” (2,223mm) **[or]** 8’10½” (2,705mm)

OTHER - [ ]

11 – Entrance Width & Type: **[Match to capacity selected above]**

[2500 #] Single-Slide Door 3’6” x 7’0” **[or]** 8’0”
(1067mm x 2,134mm or 2,438mm)
[3000 #] Single-Slide Door 3’6” x 7’0” **[or]** 8’0”
(1067mm x 2134 mm x 2134 mm or 2,438mm)
[3500 #] Single-Slide Door 3’6” x 7’0” **[or]** 8’0”
(1,067mm x 2,134mm or 2,438mm)
[2500 #] Center-Open. Doors 3’6” x 7’0” **[or]** 8’0”
(1,067mm x 2,134mm or 2,438mm)
[3000 #] Center-Open. Doors 3’6” x 7’0” **[or]** 8’0”
(1,067mm x 2,134mm or 2,438mm)
[3500 #] Center-Open. Doors 3'6" x 7'0" **[or]** 8'0"
(1,067mm x 2,134mm or 2,438mm)
[4000 #] Center Open. Doors 4’0” x 7’0” **[or]** 8’0”
(1,219 mm x 2,134mm or 2,438 mm)
[5000 #] Two-speed Doors 4’0” x 7’0” **[or]** 8”0”
(1,219mm x 2,134mm or 2,438mm)
[5000 #] Two-speed Doors 4’6” x 7’0” **[or]** 8’0”
(1372 mm x 2134 mm or 2438 mm)

12 – Main Power Supply **[Select One]**

[208, 220, 230, 240 ,440, 460, 480, 550, 575, 600]

Volts + or – 5% of normal, 3 phase, with a separate equipment grounding conductor.

13 – Cab Lighting Power Supply: 120 volts, 1 phase, 20 amp, 60hz.

14 – Stopping Accuracy: ± ¼” (6.4mm) under any loading condition or direction of travel.

15 − Speed: ± 2% of contract speed under any loading condition or direction of travel.

16 − Floor-to-floor time: 6 seconds for 12 feet (3,658mm) floor height. **OTHER - [ ]**

B. Operation - Selective Collective Automatic

1. Selective collective automatic operation: Control of the elevator shall be automatic in

   operation by means of pushbuttons in the car numbered to correspond to floors served, for registering car stops and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings. The momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, regardless of the sequence in which the buttons are registered. Each landing call shall be cancelled when answered. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed; it shall not stop at floors where "down" buttons only have been pressed, unless the stop for that floor has been registered by a car button, or unless the down call is at the highest floor for which any buttons have been pressed. Likewise, the pressing of an "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button, or unless the up call is the lowest for which any button has been pressed

2. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its travel shall reverse automatically and it shall then clear the calls registered for that direction.

3. Shall both up and down calls be registered at an intermediate floor, only the call corresponding to the direction to which the car is traveing shall be cancelled upon the stopping of the car at the landing. The control shall be arranged so that normally one car shall be parked at the main floor, and the other, a free car, shall answer the landing calls. Should both cars appear to finish their calls at the main floor, the car which arrived first shall become the free car to answer subsequent landing calls. An idle free car shall answer any landing call either above or below where it may be standing except main floor calls and basement landing calls if a basement is served. When the free car is clearing calls, the other car parked at the main floor shall automatically start to answer landing calls under the following conditions: Should an up call be registered from a landing above the free car when it is traveling down; or, inability of the free car to move in response to registered landing calls within aprroximate 20 seconds. Either car shall always respond to its own car buttons regardless of the direction of the landing calls. When either car is taken out of service for any reason, the other car shall automatically answer all calls from the landings and its own car buttons.

4. The operating buttons in the car and at the landings shall be mounted in flush plates or swing return panel of a stainless steel finish. The car panel shall contain a key-operated stop switch to interrupt the power supply independently of the requlr operating device. The opening of the stop switch shall not cancel the registered calls and after this switch is again closed, the car shall continue to answer its various calls. The car panel shall also contain a key-operated car light switch and a fan switch. The buttons in the car and hall stations shall be of the light-up type which will be illuminated when the button is pressed indicating that a call has been registered for that landing.

5. Independent service: A key-operated switch shall be provided for each elevator for selecting independent service operation. When this switch is in the independent service position the elevator shall be disconnected from the selective-collective control system

and all hall calls will be transferred to the other car. The elevator taken out of service may then be run from its car buttons for any special usage.

6. Load weighing device: Each car shall be provided with a load weighing device which, when the particular car is filled to an adjustable percentage of the capacity load, shall cause the car to by-pass the landing calls but not car calls. These passed landing calls shall remain registered for the next following car. The device shall be unaffected by the action of compensating chain or rope.

[Other Requirements]

[The following are standard for Simplex, Duplex or Multi-Car Operation]

C. Car Operating Features

1- Full Collective Operation
2- Anti-nuisance
3- On/Off Light switch and Fan switch
4- Load Weighing Bypass
5- Independent Service with Key Switch
6- Firefighters' Service Phase I and Phase II
7- Top of Car Inspection Operation
8- Single Speed Fan

[Include the following options for duplex or multi-car Operation, delete for Simplex and renumber accordingly.]

9- Zoned Car Parking
10- Moderate Outgoing Traffic Operation
11- Moderate Incoming Traffic Operation

[Include the following options as required. Renumber accordingly].

12- Car to Lobby Operation **[Multi-car group with lobby panel only]**
12 Zoned Access At Bottom Landing
14- Zoned Access At Upper Landing
15- Car Secure Access
16- Provision for Card Reader in Car (Card Reader provided and installed by others).
17- Express Priority Service with Key Switch(es) at **[enter landing designation(s)].**
18- Second Riser of Hall Butons. **[Not available if any car in the group has a rear Entrance]**
19- Emergency Hospital Service.
20- Automatic Standby Power Operation with Manuel Override.

This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. One or more cars are returned at a time. Preference is given to loaded cars over empty cars in order to reduce passenger wait

times. A car must respond by beginning to move toward the designated landing within a pre-determined time. If a car does not respond, it is automatically placed in a "Not Available" mode while other cars are moved. If a car was not returned to the designated landing on the first try, a second attempt is made. If the second attempt is not successful, the car will remain in a "Not Available" mode and can only be moved by manual means. Once each car has returned to the designated landing, the doors will remain open for a predetermined amount of time.

When all cars have successfully returned to the designated landing or have attempted to move twice, automatic selection of the car(s) to run on normal operation will occur.

If for any reason a car selected for normal operation under standby power is delayed for 60 seconds, the car will be placed in a "Not Available" mode and another car will be selected for normal operation based on the priorities listed above.

Manual Override of Standby Power Operation may be achieved by a manual input for each car via a strip switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.

If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.

If car selection is changed by Manual Override while a car is running in return or normal operation under standby power, the newly selected car will not be permitted to run until the car that had been running has stopped, opened its doors, and gone into Standby Power Wait state.

[Other Requirements]

2.03 Equipment: Signal Fixtures

Vandal Resistant-Stainless Steel Finish, etched for illumination

[Selection of other types may be approved for Administrative type facilities not subject to extended use.]

A. Car Operating Panel: Provide panel, which contains all push buttons, key switches and message indicator for elevator operating panel.

B. Car Vandal Resistant Telephone: Provide stainless steel type, push button activation located in car operating panel.

C. Car Position Indicator: Provide a digital indicator integral to the car-operating panel.

D. Hall Position Indicator: Provide a digital indicator at the main entrance above each hoistway entrance frame. Incorporate in same fixture when hall lanterns are provided.

E. In-Car Lantern and Chime: A directional lantern visable from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

[Select E or F]

F. Hall Lanterns and Chime: A directional lantern visible from the corridor shall be provided at each hall entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

[Other Options]

2.04 Equipment: Car Components

A. Carframe and Safety: A carframe fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the carframe and shall be Type "B", flexible guide clamp type.

B. Car Platform: The car platform shall be of all steel construction. Load weighing devices shall be mounted under the platform.

1. **[Platform overlay for heavy loading**: constant for duties (+) or (-) 4000#, **optional with other duties].** The platform shall be provided with a minimum 5/8" 16 (mm) thick plywood overlay. Platform overlay allows the car platform to accommodate one-piece loads weighing up to 25% of the rated capacity, such as wheeled food carts, stretchers, x-ray equipment, etc.

C. Car Door(s) and Front Return Finish: Stainless Steel, Satin Finish

1. Provide extruded aluminum car door sill.

D. Car Wall Finish: **[Describe]**

E. Car Ceiling Finish: **[Describe]**

F. Car Flooring Finish: **[Describe]**

G. Ceiling Lighting: **[Describe]**

H. Handrail: Standard Stainless steel, satin finish mounted on the rear cab wall.

I. Certificate Frame: Stainless steel, satin finish, tamper proof.

J. Protective Pads and Hooks: Provide pads at the sides and rear of the car enclosure, fire-retardant type. Pad hooks shall be stainless steel finish and be permanently mounted.

K. Emergency Car Lighting: An emergency power unit employing a sealed rechargeable battery and totally static currents shall be provided to illuminate the elevator car and provide current to the emergency alarm bell in the event of building failure.

L. Alarm Bell: Bell mounted on top of car that is activated when the Alarm button in the car-operating panel is engaged. A rated sound pressure level of 80dba at a distance of 3.0m from the device.

M. Exhaust Fan: An exhaust fan shall be mounted on the car top provided with a suitable guard in the car.

N. Utility Outlet: A 120-volt, 20-amp outlet, GFCI type shall be furnished on the top of the cab.

O. Car Top Inspection Station: A car top inspection station shall be located on the car top. Provide emergency stop switch, inspection and automatic switch position; constant pressure Safety, Up and Down buttons, including firefighters service Phase I recall buzzer.

P. Car Top Lighting: Provide car top lighting with on/off switch and suitable guard for light.

Q. Roller Guides: Roller Guides shall be provided for the car and counterweights. Each roller shall be capable of being individually removed and individually adjustable.

2.05 Equipment: Machine Room Components

A. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.

1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
3. Field conductors terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (<30 volts DC).
4. Controllers shall be designed and tested for Electromagnetic Interference (EMI)

immunity according to the EN 12016 (May 1998); "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity".

5. **[Optional - Consult with Electrical Engineer]** Controllers shall be equipped with the following filters and gaskets to reduce Electromagnetic Interference (EMI) emissions to levels that comply with the EN 12015 (May 1998); "EMC Product Family standards for lifts, escalators, and passenger conveyors Part 1 – Emission";
   a. Current Harmonic Filter
   b. Anti Pollution Device
   c. Single Phase Filter
   d. Current Controlled Choke
   e. SOFT-SHIELD® 5000 Conductive Fabric over Foam Gaskets

B. Machine, Motor and Brake with AC Variable Frequency Drive

1. The machine shall be of the single worm geared traction type, with motor, brake, gearing and driving sheave mounted in proper alignment on a steel bedplate. The worm shall be of hardened and ground steel, integral with the worm shaft, and shall be provided with a ball or roller thrust bearing designed to take the end thrust of the worm in both directions. The ring gear shall be hobbed from a bronze rim, which shall be accurately fitted and bolted to the gear spider. The sheave and gear spider shall be supported by heavy ball or roller bearings. The roller and anti-friction metal bearing shall be provided with adequate means of lubrication. Sound and isolation pads shall be installed beneath the machine bedplate to reduce vibration and noise transmission to the building structure.

2. Variable voltage variable frequency AC drive system: The drive shall have the capability of being adjusted or programmed to achieve the required motor voltage, current and frequency, in order to properly match the characteristics of the AC motor. The drive shall not create excessive audible noise in the AC elevator motor. The drive shall be of a heavy-duty type, capable of delivering sufficient current required to accelerate the elevator to rated contract speed with rated load. The drive shall provide speed regulation appropriate to the motor type.

3. For non-regenerative drives, a means shall be provided for removing regenerated power from the drives DC power supply during dynamic braking. This power shall be dissipated in a resistor bank, which shall be an integral part of the controller.

4. Failure of the system to remove regenerated power shall cause the drive's output to be removed from the motor. The drive shall incorporate a **closed loop** feedback system to adequately control the speed of the motor at all times.

5. AC drive motor: Capable of developing the required starting torque and current, at a high efficiency rating and low slip frequency. The motor shall be compatible in all aspects to the new VVVF drive control system and comply with all codes and standards set forth for elevator rated duty motors.

6. Isolation transformers: Protect against electrical feedback to and from the power source. Provide the necessary line filters, noise, spike or notching suppressors to protect

   against feedback and noise that would affect other electrical components and computer-operated equipment in the building.

7. Electric brake: Shall be spring applied. It shall be held open by an electromagnet activated by the controller and designed to make smooth, positive stops. It shall be designed to automatically apply in event of interruption of power supply from any cause. The electric brake shall mechanically set each time the elevator stops.

8. Ascending car over-speed and Unintended car movement protection: Protection shall be provided with a device to prevent the car from striking the hoistway overhead structure and to prevent unintended car movement away from the landing with the hoistway door not in the locked position. These safety requirements shall operate and function in accordance with the ANSI A17.1 Code.

9. Heavy-duty deflector sheave and bearings: Sheave shall be aligned accurately with the hoisting machine drive sheave.

10. Governor: The car safety shall be operated by a centrifugal speed governor located at the top of the hoistway in the machine room.

2.06 Equipment: Hoistway Components

A. Hoistway Operating Devices:

   1. Emergency stop switch in the pit
   2. Terminal stopping switches
   3. Car positioning vanes/tapes, etc.

B. Buffers: Oil type for car and counterweight at the bottom limits of travel.

C. Guide Rails: Guides for the elevator shall be planed ("T" type, not less than 15 pounds per foot for the car and 8 pounds per foot for the counterweight) steel elevator guide rails, properly fastened to the building structure with steel brackets

D. Ropes: Hoist ropes shall be traction steel in size, construction and number to insure proper operation of the elevator and give satisfactory wearing qualities. All ropes shall consist of adequate strands wound about a hemp core center.

E. Compensation: When required, ropes wth compensating sheaves shall be provided, or chain, which is encased to prevent unnecessary noise.

F. Wiring: All necessary wiring and traveling cables shall be provided including required raceways. Comply with the requirements of the NFPA 70 National Electrical Code.

Provide a minimum of 10% spares and a minimum of three (3) shielded pairs in the traveling cable(s), or as required.

G. Hoistway Entrances:

1- Frames: Entrance frames shall be bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be 14 gauge (minimum thickness) sheet steel. Additional sill support will be provided with 4'0" and 4'6" two speed opening door arrangements and larger. Sills shall be extruded aluminum. The head of the entrance frame shall not be used to support the weight of the wall over the frame.

2- Doors: Entrance doors shall be hollow metal construction with vertical internal channel reinforcement.

3- Entrance and Door Finish: **[Select satin finish, stainless steel or with white power paint, color selected by Designer]**

4- Entrance Markings: Entrance jambs shall be marked with 4" x 4" (102mm x102mm) plates having raised floor markings with Braille adjacent. Markings shall be provided on both sides of the entrance. Plates shall be permanently attached. Adhesive types are not acceptable.

5- Sight Guards: Sight guards shall be provided and finished same as doors.

6- Fascia Plates: Provide a minimum of 16 gauge steel, galvanized or painted with primer and two finish coats of enamel.

7- Toe Guards: Same requirements as fascia plates above.

8- Hanger Covers: Same requirements as above.

H. Door Operation: A direct current, motor driven, door operator which operates the car and hoistway doors simultaneously shall be furnished and installed. Door movements shall be electrically cushioned at both limits of travel. The leading edge of the car door shall be provided with a electronic door curtain arranged to automatically return car and hoistway doors to the open position in the event the doors are obstructed during the closing cycle. Doors then shall resume closing cycle. Doors shall automatically open as the car arrives at the landing and shall automatically close after an adjustable time interval or when the car is dispatched to another landing. Alternating current controlled units with oil checks, or other deviations from the above are not acceptable.

I. Hoistway Door Interlocks: Each hoistway entrance shall be equipped with an approved type interlock tested as required by ANSI A17.1 Code. The interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position, and shall prevent opening the doors at any landing from the corridor side

unless the car is at rest at that landing or is in the leveling zone and stopping at that landing. Interlocks shall bear Underwriter's Laboratories or CSA label of approval.

J. Hoistway Door Unlocking Devices and Hoistway Access Switches: Provide hoistway door unlocking devices at each landing. Provide hoistway access switches at each top and bottom terminal landing.

K. Door Hangers and Tracks: Complete door hangers and tracks shall be provided for each car and entrance door.

1- Hangers shall be sheave-type, arranged for two-point suspension.

2- Sheaves shall be steel with flange groove into which a non-metallic-tire shall be vulcanized securely. Bearings for sheaves and rollers shall be ball type, sealed to retain lubrication.

3- Steel housing hanger brackets shall be provided for each door. Rollers with ball bearings, or oilite, shall be provided to take the door upthrust.

Note: **Integral type hangers and tracks shall not be used at student residence type buildings without special approval.**

4- Door tracks shall be cold-rolled, smooth surface conforming to the tread of the hanger sheaves and rollers.

2.07 Passenger Sensing Device

A. An electronic full entrance detector designed to operate as described below shall be provided at the entrance of the elevator car.

B. After a stop is made, the doors shall remain open for an adjustable time interval. Closing may be initiated instantaneously by registration of a car call.

C. The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a predetermined time, the electronic door reversal device shall be inhibited and the doors shall close at a reduced speed and torque sounding an audible signal. Closing shall be initiated one-half second after the passenger or object has moved from the opening.

Part 3 - Execution

3.01 Preparation

A. Prior to commencing elevator installation, inspect hoistways, hoistway openings, pit and machine rooms as constructed. Verify that hoistway, pit, machine room and openings are of correct size and within tolerance and are ready for work of this section. Notify the

General Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner

acceptable to the installer. Arrange for temporary electrical power to be available for installation work and testing of elevator components.

3.02 Installation of Elevator System

A. Components will be arranged in machine room so equipment can be removed for repairs or replaced without dismantling or removing other equipment components.

B. Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays.

C. Set entrances in vertical alignment with car openings, and aligned with plumb hoistway lines.

D. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort. Adjust doors to prevent opening of doors at any landing on the corridor side unless the car is at rest at that landing or is in the leveling zone and stopped at that landing. Adjust automatic floor leveling feature at each floor to achieve within ¼" of the landing.

3.03 Permits and Test

A. The elevator contractor shall obtain and pay for all necessary permits relating to the installation of the elevator at his expense, shall make all test as required by the governing codes in effect at the time of the award.

3.04 Demonstration

A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine and demonstrate that control systems and operating devices are functioning properly.

3.05 Additional Warranty Bid Price

A. Warranty

1. In addition to the warranty/maintenance required by 1.07 and 1.08, provide the same for an additional forty-eight (48) months. This all inclusive full maintenance service shall begin at the conclusion of the warranty/maintenance.

2. The elevator contractor shall quote a firm price for the forty-eight (48) months of extended all inclusive full maintenance service.

3. The cost for this additional service shall not be taken from the construction contract funds, but will be paid by the owner (at the conclusion of the warranty/maintenance) in forty-eight (48) equal payments.

B. Price for additional Warranty/Maintenance for forty-eight (48) months:

$_____.

End of Section

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