

Retrofit Elevators - Building 500  
VA West Los Angeles  
PROJ #691-13-103

PROJECT MANUAL

*100% Construction Documents*  
*03/13/2013*



PERKINS  
+ WILL

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**SECTION 01 00 00**  
**GENERAL REQUIREMENTS**

**1.1 GENERAL INTENTION**

**A. CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS**

1. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.
2. Organization of the Specifications into divisions, sections, and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

B. Visits to the site by Bidders may be made only by appointment with the Medical Center Engineering Officer.

C. Offices of Perkins+Will, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

D. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the Resident Engineer in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the Resident Engineer.

E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

F. Prior to commencing work, general contractor shall provide proof that a OSHA designated "competent person" (CP) (29 CFR 1926.20(b)(2) will

maintain a presence at the work site whenever the general or subcontractors are present.

G. Training:

1. All employees of general contractor or subcontractors shall have the 10-hour OSHA Construction Safety course for onsite staff and 30-hour OSHA course for project superintendent/management (competent person) or other relevant competency training, as determined by RE/COR acting as the Construction Safety Officer with input from the facility Construction Safety Committee.
2. Submit training records of all such employees for approval before the start of work.

H. VHA Directive 2011-36, Safety and Health during Construction, dated 9/22/2011 in its entirety is made a part of this section

**1.2 STATEMENT OF BID ITEM(S)**

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for Renovate Building 500 Elevators as required by drawings and specifications. The project will upgrade 6 passengers and 4 service elevators; not limited to the replacement of new controller, panels, energy efficient motors, gears, lighting, finishes inside cab & exterior finishes, lighting, fire alarm, vents, AC system tuned and balanced, components inside elevator control room and lobbies at each floor, push bottoms, displays, cables, safeties and related components to perform renovation of elevators.

**1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

- A. AFTER AWARD OF CONTRACT, sets of specifications and drawings will be furnished. These drawings and specifications will consist of those returned by prospective bidders.
- B. Additional sets of drawings may be made by the Contractor, at Contractor's expense, from compact disk furnished by Issuing Office.

**1.4 CONSTRUCTION SECURITY REQUIREMENTS**

- A. Security Plan:



1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
2. The Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. For working outside the "regular hours" as defined in the contract, The General Contractor shall give 3 days notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The Contractor may return to the site only with the written approval of the Contracting Officer.

C. Guards: N/A

D. Key Control:

1. The Contractor shall provide duplicate keys and lock combinations to the Resident Engineer for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. The Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

E. Document Control:

1. Before starting any work, the Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to

following goals and maintaining confidentiality of "sensitive information".

2. The Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
4. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
5. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
6. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
7. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
8. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
  - a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
  - b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

F. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. Separate permits shall be issued for Contractor and its employees for parking in designated areas only.

## 1.5 FIRE SAFETY

A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

1. American Society for Testing and Materials (ASTM):

E84-2009.....Surface Burning Characteristics of Building  
Materials

2. National Fire Protection Association (NFPA):

10-2010.....Standard for Portable Fire Extinguishers

30-2008.....Flammable and Combustible Liquids Code

51B-2009.....Standard for Fire Prevention During Welding,  
Cutting and Other Hot Work

70-2011.....National Electrical Code

241-2009.....Standard for Safeguarding Construction,  
Alteration, and Demolition Operations

3. Occupational Safety and Health Administration (OSHA):

29 CFR 1926.....Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Project and Facility Safety Manager officer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.

- C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- E. Temporary Construction Partitions:
  - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.
  - 2. Install one-hour temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
  - 3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- F. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Resident Engineer and facility Safety Manager.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Resident Engineer and facility Safety Manager.

- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- M. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Project Engineer. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- N. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Resident Project and facility Safety Manager.
- O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Engineer. Obtain permits from facility Safety Manager at least 96 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.
- P. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Project Engineer and facility Safety Manager.
- Q. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- R. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- S. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

T. If required, submit documentation to the Resident Engineer that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

**U. Fines for violations of Fire Safety Requirements.**

1. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
2. Disposed of waste and debris in accordance with NFPA 241. Remove from buildings daily (see table 1.5.V).
3. Tripping, setting off, of fire alarms and /or flow switches, without proper notification is a violation fineable at the minimum of \$2,500 per offense plus expenses.
4. Smoke detectors that were bagged, covered, or any way rendered inoperable during work shift must be made operable at the end of said work shift. This offense is fineable at the minimum of \$2,500 per offense plus expenses.
5. Any false alarm that causes a visit by the fire department is fineable at the minimum of \$2,500 per offense plus expenses.
6. Hot Work: The following offenses are a violation fineable at a minimum of \$2,500 per offense plus expenses: a) Failure to obtain a hot work permit prior to work, b) Failure to maintain Fire Watch, as required during Hot Work, and c) Failure to remove smoke detector cover after said Hot Work is completed at the end of the work shift for the day, whichever is sooner.
7. Fines for Open Fire Doors: Fire doors at all times shall be kept closed, where required. These doors shall not be left open in any manner; they shall not be propped or tied open. Violations are fineable at no less than \$2,500 per violation plus expenses. These fines will be imposed due to contractor's fault, negligence or failure to comply with NFPA codes and VA Policies.

V. Other finable construction incidents are as listed on table below:

Construction Barricade	1 <sup>st</sup> Offence	2 <sup>nd</sup> Offence	3 <sup>rd</sup> Offence
Temporary walls sealed, no penetrations	Warning	\$250.00	\$750.00
Temporary doors have closers	Warning	\$250.00	\$750.00
Door frames have gasket, doors close and seal properly	Warning	\$250.00	\$750.00
Construction site door locked from unauthorized entry	Warning	\$250.00	\$750.00

Interstitial properly sealed and maintained to prevent dust travel	Warning	\$250.00	\$750.00
<b>Fire Safety (Fire Protection)</b>	<b>1<sup>st</sup> Offence</b>	<b>2<sup>nd</sup> Offence</b>	<b>3<sup>rd</sup> Offence</b>
Fire sprinkler heads are obstructed	Warning	\$500.00	\$1000.00
Fire sprinkler heads not protected from damage during construction	Warning	\$500.00	\$1000.00
Fire extinguisher missing	Warning	\$250.00	\$500.00
Fire extinguishers not properly mounted	Warning	\$250.00	\$500.00
Fire extinguishers not checked monthly	Warning	\$250.00	\$500.00
Fire extinguishers annual service not done	Warning	\$250.00	\$500.00
Blocked fire exits	Warning	\$2,500	\$5,000
Failure to maintain fire watch during hot work with appropriately trained staff	Warning	\$2,500	\$5,000
Propped open or tied open fire or smoke doors	\$2,500	\$3,500	\$5,000
Failure to obtain a hot work permit prior to work	\$2,500 plus expenses	\$3,500 plus expenses	\$5,000 plus expenses
Setting off fire alarm system without prior written COR approval	\$2,500 plus expenses	\$3,500 plus expenses	\$5,000 plus expenses
Setting off a fire sprinkler without prior written COR approval	\$2,500 plus expenses	\$5,000 plus expenses	\$10,000 plus expenses

<b>Jobsite &amp; Cleanliness</b>	<b>1<sup>st</sup> Offence</b>	<b>2<sup>nd</sup> Offence</b>	<b>3<sup>rd</sup> Offence</b>
Project area not kept clean and debris not removed daily	Warning	\$150.00	\$250.00
Walk-off mats (clean & adequate to contain dust)	Warning	\$150.00	\$500.00
Debris not removed daily and in suitable containers (closed/covered, wheels cleaned prior to transport)	Warning	\$250.00	\$500.00
Construction personnel & materials not transported on dedicated service elevator	Warning	\$250.00	\$500.00
Adjacent floor and corridor areas not clean and clear	Warning	\$150.00	\$250.00
Construction personnel not wearing required PPE (e.g., hardhat, protective eyewear, footwear).	Warning	\$150.00	\$250.00
Construction workers not wearing proper ID	Warning	\$150.00	\$250.00
Permits not properly pulled and posted (ILSM's & Infection Control Permits, Hot Work, etc.)	Warning	\$250.00	\$500.00
Proper exit signage not posted	Warning	\$150.00	\$250.00
Exits not providing free and unobstructed access	Warning	\$250.00	\$500.00
Alternate exits are not clearly identified in and around construction	Warning	\$250.00	\$500.00

#### **1.6 OPERATIONS AND STORAGE AREAS**

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- D. Working space and space available for storing materials shall be as determined by the Project Engineer.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Project Engineer where required by limited working space.
  - 1. Do not store materials and equipment in other than assigned areas.
  - 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
  - 3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.



- F. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer. All such actions shall be coordinated with the Utility Company involved:
- G. Phasing: To insure such executions, Contractor shall furnish the Resident Engineer with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the Resident Engineer two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Medical Center Resident Engineer and Contractor.
- H. Building(s) No. 500 will be occupied during performance of work.
- Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
- K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer.
1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be

interrupted without prior approval of Resident Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval.

2. Contractor shall submit a request to interrupt any such services to Resident Engineer, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer.
5. In case of a contract construction emergency, service will be interrupted on approval of Resident Engineer. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

#### **1.7 ALTERATIONS**

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Resident Engineer and a representative of buildings in which alterations occur and areas which are anticipated routes of

access, and furnish a report, signed by both, to the Contracting Officer. This report shall list by rooms and spaces:

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of building.
  2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
  3. Shall note any discrepancies between drawings and existing conditions at site.
  4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Resident Engineer.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Resident Engineer, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Resident Engineer together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:

1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

#### **1.8 INFECTION PREVENTION MEASURES**

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group//as specified here//. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Resident // Engineer and Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
  1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. In addition:
  1. The RE and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms

are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.

2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.

D. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.

1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Resident Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
2. Do not perform dust producing tasks within occupied areas without the approval of the Resident Engineer. For construction in any areas that will remain jointly occupied by the medical Center and Contractor's workers, the Contractor shall:
  - a. Provide dust proof one-hour temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Barriers shall be sealed and made presentable on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the only hazard, and an agreement is reached with the Resident Engineer and Medical Center.
  - b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and

secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.

- c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
- d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as they are created. Transport these outside the construction area in containers with tightly fitting lids.
- e. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
- f. Using a HEPA vacuum, clean inside the barrier and vacuum ceiling tile prior to replacement. Any ceiling access panels opened for investigation beyond sealed areas shall be sealed immediately when unattended.
- g. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
- h. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

E. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
3. All new air ducts shall be cleaned prior to final inspection.

#### **1.9 DISPOSAL AND RETENTION**

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. PCB Transformers and Capacitors: The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors. The transformers and capacitors shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR), Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7 also apply. Upon removal of PCB transformers and capacitors for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form

8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's Chief.

a. Copies of the following listed CFR titles may be obtained from the Government Printing Office:

40 CFR 261.....Identification and Listing of Hazardous Waste

40 CFR 262.....Standards Applicable to Generators of Hazardous Waste

40 CFR 263.....Standards Applicable to Transporters of Hazardous Waste

40 CFR 761.....PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions

49 CFR 172.....Hazardous Material tables and Hazardous Material Communications Regulations

49 CFR 173.....Shippers - General Requirements for Shipments and Packaging

49 CFR 173.....Subpart A General

49 CFR 173.....Subpart B Preparation of Hazardous Material for Transportation

49 CFR 173.....Subpart J Other Regulated Material; Definitions and Preparation

TSCA.....Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7

#### **1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS**

A. The Contractor shall preserve and protect all structures, and equipment, on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by



workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

**(FAR 52.236-9)**

- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

**1.11 RESTORATION**

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

#### **1.12 PHYSICAL DATA**

- A. Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

#### **1.13 AS-BUILT DRAWINGS**

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

#### **1.14 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:
  - 1. Permission to use each unit or system must be given by Resident Engineer. If the equipment is not installed and maintained in

accordance with the following provisions, the Resident Engineer will withdraw permission for use of the equipment.

2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
  3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
  4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
  5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

#### **1.15 TEMPORARY USE OF EXISTING ELEVATORS**

- A. Use of existing elevators for handling building materials and Contractor's personnel will be permitted subject to following provisions:
1. Contractor makes all arrangements with the Resident Engineer for use of elevators. The Resident Engineer will ascertain that elevators are in proper condition. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.

2. Contractor covers and provides maximum protection of following elevator components:
  - a. Entrance jambs, heads soffits and threshold plates.
  - b. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.
  - c. Finish flooring.

#### **1.16 TEMPORARY USE OF NEW ELEVATORS**

- A. The Contractor and his personnel shall be permitted use of new elevator(s) subject to the following provisions:
  1. Contractor shall make arrangements with the Resident Engineer for use of elevator(s). Contractor may obtain elevator(s) for exclusive use.
  2. Prior to the use of elevator(s), the Contractor shall have the elevator(s) inspected and accepted by an ASME accredited, certified elevator safety inspector. The acceptance report shall be submitted to the Resident Engineer.
  3. Submit to the Resident Engineer the schedule and procedures for maintaining equipment. Indicate the day or days of the week and total hours required for maintenance. A report shall be submitted to the Resident Engineer monthly indicating the type of maintenance conducted, hours used, and any repairs made to the elevator(s).
  4. The Contractor shall be responsible for enforcing the maintenance procedures.
  5. During temporary use of elevator(s) all repairs, equipment replacement and cost of maintenance shall be the responsibility of the Contractor.
  6. Personnel for operating elevator(s) shall not be provided by the Department of Veterans Affairs.
  7. Contractor shall cover and provide maximum protection of the entire elevator(s) installation.
  8. The Contractor shall arrange for the elevator company to perform operation of the elevator(s) so that an ASME accredited, certified elevator safety inspector can evaluate the equipment. The Contractor shall be responsible for any costs of the elevator company.

9. All elevator(s) parts worn or damaged during temporary use shall be removed and replaced with new parts. This shall be determined by an ASME accredited certified elevator safety inspector after temporary use and before acceptance by the Government. Submit report to the Resident Engineer for approval.
10. Elevator shall be tested as required by the testing section of the elevator(s) specifications before acceptance by the Department of Veterans Affairs.

#### **1.17 AVAILABILITY AND USE OF UTILITY SERVICES**

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities

#### **1.18 TESTS**

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a complex which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.
- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably

short period of time during which operating and environmental conditions remain reasonably constant.

- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

#### **1.19 INSTRUCTIONS**

- A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the Resident Engineer coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.
- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to

assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Resident Engineer and shall be considered concluded only when the Resident Engineer is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in **accordance with requirements for instructors above.**

END OF SECTION

**SECTION 01 31 00**  
**PROJECT MANAGEMENT AND COORDINATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Information (RFIs).
  - 4. Project meetings.
- B. Related Requirements:
  - 1. Section 01 32 16.15 "PROJECT SCHEDULES" for preparing and submitting Contractor's construction schedule.
  - 2. Section 01 00 00 "GENERAL REQUIREMENTS" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 01 91 00 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

**1.2 DEFINITIONS**

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list



addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

#### **1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL**

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
  1. Include special personnel required for coordination of operations with other contractors.
- B. Twenty-four (24) Hour Call: The Contractor shall have personnel on call 24 hours per day, for emergencies during the course of the Project. The Owner shall be provided with a 24- hour emergency contact number of Contractor's personnel. Contractor shall be able to respond to any emergency call and have personnel on-site within two (2) hours after contact. Numbers to be made available to the Owner shall include home, office and mobile numbers for the following:
  1. Contractor's project manager.
  2. Contractor's field superintendent.
  3. Owner or company officer of Contractor.

#### **1.5 GENERAL COORDINATION PROCEDURES**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

#### 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if

coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

- a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
- b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
- c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

- B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement

plan drawings with section drawings where required to adequately represent the Work.

2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
  - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
  - b. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

#### **1.7 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS**

- A. General: Carefully study and compare Contract Documents with existing conditions at Project site and shall at once report in writing to Architect any error, inconsistency or omission discovered or any materials, systems, procedures, or methods of construction, either shown on the Drawings or specified, which the Contractor feels are incorrect, inadequate, obsolete, or unsuitable for purpose intended.
- B. Before starting each portion of the Work, carefully study and compare the various Drawings and other Contract Documents related to that portion of the Work, and information furnished by the Owner, take field measurements of existing conditions related to that portion of the Work, and observe conditions at the site.
- C. Any errors, discrepancies, inconsistencies, or omissions discovered shall be promptly reported to the Architect as a request for interpretation.

1. Contractor shall not proceed with the Work without written clarification from the Architect.
- D. In the case of conflicts or discrepancies between Drawings and Specifications, or within either Document not clarified by Addendum, promptly submit written request to the Architect as a request for interpretation.
  1. Contractor shall not proceed with the Work without written clarification from the Architect.
- E. Contractor shall request clarification in sufficient time to avoid delays and increases in the Contract Sum.
- F. Contractor's failure to report discrepancies or omissions in the Contract Documents, or Contractor- or Subcontractor-generated assumptions, in lieu of Architect-issued clarifications regarding the intent of the Contract Documents, shall not be used as a basis for future claims once the apparent discrepancies or omissions have been reconciled by appropriate interpretation issued by the Architect.

#### **1.8 REQUESTS FOR INFORMATION (RFIs)**

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, prepare and submit an RFI in the form specified.
  1. RFIs shall originate with Contractor. RFIs submitted by other entities will be returned with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  3. The Owner reserves the right to assess the Contractor for the cost (based on time and materials) of the review process performed by the Architect and/or any of the Architect's or Owner consultants when RFI's fail to conform to the requirements stated herein, or in the opinion of the Architect, are unnecessary or frivolous (i.e.; the subject of the inquiry noted in the RFI is suitably and/or clearly addressed in the Contract Documents).
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.

5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716, or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.

Comment [SD1]: Is thi necessary??

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
  4. RFIs involving request for remedial action to correct nonconforming work, which are returned in more than fourteen working days, are not eligible for Contractor's request for an increase in Contract Sum or an extension of Contract Time.
  5. Where any action or response falls due on a Saturday, Sunday, or legal holiday, such action or response shall be considered due on the next business day which is not a Saturday, Sunday or a legal holiday.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.



#### 1.9 PROJECT AND PRECONSTRUCTION MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times, a minimum of 5 business days prior to meeting date.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Contractor is to schedule and Architect will conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
  - 1. Architect will conduct the conference to review responsibilities and personnel assignments.
  - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Procedures for testing and inspecting.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.

- k. Submittal procedures.
  - l. Preparation of record documents.
  - m. Use of the premises.
  - n. Work restrictions.
  - o. Working hours.
  - p. Owner's occupancy requirements.
  - q. Responsibility for temporary facilities and controls.
  - r. Procedures for moisture and mold control.
  - s. Procedures for disruptions and shutdowns.
  - t. Construction waste management and recycling.
  - u. Parking availability.
  - v. Office, work, and storage areas.
  - w. Equipment deliveries and priorities.
  - x. First aid.
  - y. Security.
  - z. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting (The Architect) will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.

- i. Possible conflicts.
  - j. Compatibility requirements.
  - k. Time schedules.
  - l. Weather limitations.
  - m. Manufacturer's written instructions.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

- a. Preparation of record documents.
- b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
- c. Submittal of written warranties.
- d. Requirements for preparing operations and maintenance data.
- e. Requirements for delivery of material samples, attic stock, and spare parts.
- f. Requirements for demonstration and training.
- g. Preparation of Contractor's punch list.
- h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
- i. Submittal procedures.
- j. Owner's partial occupancy requirements.
- k. Installation of Owner's furniture, fixtures, and equipment.
- l. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at biweekly intervals. Unless Owner determines that more frequent meetings are necessary.
  1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Conduct separate coordination meetings with subcontractors. Owner and Architect will not be present at such meetings.
  4. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties

involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.

2) Sequence of operations.

3) Status of submittals.

4) Deliveries.

5) Off-site fabrication.

6) Access.

7) Site utilization.

8) Temporary facilities and controls.

9) Progress cleaning.

10) Quality and work standards.

11) Status of correction of deficient items.

12) Field observations.

13) Status of RFIs.

14) Status of proposal requests.

15) Pending changes.

16) Status of Change Orders.

17) Pending claims and disputes.

18) Documentation of information for payment requests.

5. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION**

**SECTION 01 32 16.15**  
**PROJECT SCHEDULES**  
*(SMALL PROJECTS - DESIGN/BID/BUILD)*

**PART 1- GENERAL**

**1.1 DESCRIPTION:**

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

**1.2 CONTRACTOR'S REPRESENTATIVE:**

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COTR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

**1.3 CONTRACTOR'S CONSULTANT:**

- A. The Contractor shall submit a qualification proposal to the COTR, **within 10 days** of bid acceptance. The qualification proposal shall include:
1. The name and address of the proposed consultant.
  2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
  3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant

within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

#### 1.4 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

#### 1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or

start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. **The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- D. Within **30 calendar days** after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
1. Notify the Contractor concerning his actions, opinions, and objections.
  2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within **14 calendar** days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.



F. The Complete Project Schedule shall contain approximately \_\_\_\_\_work activities/events.

#### **1.6 WORK ACTIVITY/EVENT COST DATA**

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

#### **1.7 PROJECT SCHEDULE REQUIREMENTS**

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
  - 1. Show activities/events as:
    - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
    - b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.

- c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
  - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
  - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
  3. Break up the work into activities/events of a duration no longer than **20 work days** each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COTR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
  4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
  5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
  2. The planned number of shifts per day.
  3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COTR. Failure to include any element of work

required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COTR's approval of the Project Schedule.

- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

#### **1.8 PAYMENT TO THE CONTRACTOR:**

- A. **Monthly**, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.
- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

#### **1.9 PAYMENT AND PROGRESS REPORTING**

- A. **Monthly** schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
1. Actual start and/or finish dates for updated/completed activities/events.
  2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
  3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.

4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
  5. Completion percentage for all completed and partially completed activities/events.
  6. Logic and duration revisions required by this section of the specifications.
  7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular **monthly** project schedule update requirements and shall be submitted to the resident engineer within **fourteen (14) calendar days** of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**
- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any

necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

#### **1.10 RESPONSIBILITY FOR COMPLETION**

- A. If it becomes apparent from the current revised **monthly** progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
  - 1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
  - 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
  - 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

#### **1.11 CHANGES TO THE SCHEDULE**

- A. Within **30 calendar days** after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
  - 1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
  - 2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.

3. The schedule does not represent the actual prosecution and progress of the project.
  4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

#### **1.12 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COTR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion

date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

- - - E N D - - -

**SECTION 01 33 23**  
**SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, research reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall be the same as the approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
  - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
  - D. Make requests for substitution on the attached Substitution Request Form.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to ensure adequate lead time for procurement of contract-required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1-6. Assign a file number to each submittal. Contractor, in any subsequent correspondence, shall refer to this file number to expedite replies relative to previously approved or disapproved submittals.



- 1-7. The Government reserves the right to require additional submittals, whether or not specifically mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
- B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval. Submittal items shall be tabulated in the submittal package per specification section, subsection and category. Items shall correspond to the list of items included in transmittal letter
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name

- of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification) shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
5. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition

may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.

1. For each drawing required, submit one legible photographic paper or vellum reproducible.
  2. Reproducible shall be full size.
  3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
  4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
  5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
  6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
  7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

**PERKINS+WILL**

**617 West 7th Street, Suite 1200**

**Los Angeles, CA 90017**

- 1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Resident Engineer.
- 1-12. Submittal Schedule: Provide a Submittal Schedule for Product Data, Shop Drawings, and Samples to Architect coordinated with Construction Progress Schedule including Architect's review period.

- A. Coordinate submittals of related items.
- B. Updates: Submit a revised Submittal Schedule when changes occur and identify those changes since previous submittal schedule.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
  - 4. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- E. Coordinated Submittals: The Architect has designated certain submittals be made concurrently.

#### 1.13 SUBMITTALS

- A. Product Data: Standardized information published by manufacturer. At least one of manufacturer's original published literature; other copies may be legible reproductions. When Product Data is requested by Section include at the following information.
1. Manufacturer's specifications and technical data including performance data, color selection charts, construction and fabrication details and installation instructions.
  2. Mark-up specifications and technical data, charts, drawings and diagrams to delete information which is not applicable to this Project and to identify products or models, and optional features and accessories to be furnished for this Work.
    - a. Identify applicable performance characteristics and capacities.
    - b. Show dimensions and clearances required.
    - c. Identify any items / features in the submission that are available only with a surcharge or long-lead time.
  3. Clearly mark each copy to identify pertinent products or models being proposed.
  4. Modify drawings and diagrams to delete information not applicable to this Project.
  5. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- B. Shop Drawings: Customized documents prepared by Contractor or on Contractor's behalf for a specific item of work. Submit not less than the following information in a clear and thorough manner. Do not reproduce Contract Documents for use as Shop Drawings, however it is acceptable to use contract Document files as "backgrounds". See Architect's Electronic File Transfer Agreement forms attached as an Appendix to this Section, for availability, conditions of use and fee.
1. Cross-reference details in Shop Drawings to applicable Contract Documents using same sheet and detail, schedule or room-numbers used

- in Contract Documents. Do not submit or reproduce Contract Documents as Shop Drawings.
2. Include manufacturer's specifications and technical data including performance/load criteria, construction and fabrication details.
  3. Show dimensions and clearances required and relations to adjoining work.
  4. Seal and signature of professional engineer if specified.
- C. Samples: Samples are physical pieces of specified material that display properties to be evaluated or approved by Architect. Unless otherwise indicated, printed, photographic or other graphic representations of material are not acceptable. Label each sample, giving full information.
1. Material Samples shall display functional characteristics of product. Where specified submit whole assemblies with integral parts, accessories and attachment devices. Coordinate material sample submittals with submittals from other Sections for interfacing work.
  2. Color Selection Samples shall show full range of colors, textures and patterns available for Architect's selection. Identify items in submission that are available only with a surcharge or long-lead time, unless specified as "Match Architect's Sample".
  3. Record Samples are samples made by Contractor, or on Contractor's behalf, to meet requirements of Contract Documents. Submit Record Samples in sizes large enough or as sets of samples to display full range of variation expected in finished work. Size or number of pieces specified is minimum; provide larger samples or more pieces where required to depict range of finish variation. Record Samples will be used by Architect to evaluate completed work for compliance with Contract Documents.
- D. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- E. Maintenance Data: Comply with requirements specified in Section 01 00 00 "General Requirements."
1. Submit number of Maintenance Manuals requested by Contracting Officer, plus 2 for Architect and Engineer.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of

completed projects with project names and addresses, contact information of architects and owners, and other information specified.

- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- H. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- I. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- J. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- K. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- L. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- M. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- N. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.

4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.
- O. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- P. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- Q. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- R. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

#### **1.14 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.



1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

#### **1.15 PROCEDURES FOR SUBMITTING**

- A. Timeline for Submittals: Transmit submittals within time frame to prevent delay in construction activities or compromise review process. Comply with the following requirements.
  1. Administrative (Project Start-up) Submittals: As directed by the Owner, but not less than 10 days before first application of payment for construction activities.
  2. Product Data, Shop Drawings, and Sample Submittals: Submit prior to starting fabrication and in accordance with Submittal Schedule.
  3. Quality Control Submittals: Make submittals promptly to not cause construction delay.
- B. Transmittal: Accompany submittals with a completed Submittal Transmittal Form. Sample form is attached as an Appendix at the end of this Section.
  1. Failure to comply will result in return of submittal without review.
- C. Electronic Submittal Procedures - Identify and incorporate information in each electronic submittal file as follows; unless otherwise indicated, not less than the following:
  1. Product Data (copies of brochures, catalog cuts, or technical data): 8 ½ by 11 full color, pdf format.
  2. Shop Drawings: 11 by 17 pdf format.
  3. Samples: 3 sets to The Architect.
  4. Informational Submittals: 8 ½ by 11 full color, pdf format.
  5. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  6. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number

(e.g., WDCHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., WDCHS-061000.01.A).

7. Metadata: Include the following information as keywords in the electronic submittal file metadata:
  - a. Project name.
  - b. Number and title of appropriate Specification Section.
  - c. Manufacturer name.
  - d. Product name.
- D. Architect's Review Stamps: Provide 4 inch wide by 8 inch high blank space at lower right corner of each drawing sheet and on cover of product data submittals for use by Architect.
- E. Contractor's Review Process: Contractor's stamp, Subcontractor's stamp as applicable, initialed or signed, certifying prior review of submittal, verification of products, field measurements and field construction criteria and coordination of information within submittal with requirements of Work and of Contract Documents has been performed prior to making submission.
  1. Field dimensions required for communicating Design Intent.
  2. Relation to adjacent or critical features of Work.
  3. Submittals not signed and dated by Contractor will be returned without review and comment.
  4. Submittal without field measurements or coordination with other trades will be returned without review and comment.
- F. Project Identification: Locate the following information on each submittal where practical and on the accompanying transmittal.
  1. Date of submission and dates of previous submissions.
  2. Project title.
  3. Contract identification.
  4. Names of the contractor, supplier, manufacturer.
  5. Identification of products with reference to Specification Section number, and paragraph number.
  6. Reference to Drawing numbers.

G. Scope of Submittals: Submittals for each portion of the Work shall be complete and accurate. Incomplete or partial submittals will be rejected and will require resubmittal.

1. Submittals may be made of portions of the Work, but each Submittal shall be complete in respect to the information necessary for proper review by Architect and their consultants.
2. Submittals shall be combined to ensure "design intent" of the system assembly.
3. Cross out non-related material to submittal.

H. Product Data, Shop Drawings, Samples, and Quality Control Submittals: Coordinate each submittal with requirements of the Work, Construction Progress Schedule, and Contract Documents

1. Determine and verify:
  - a. Field measurements.
  - b. Catalog numbers and similar data.
  - c. Conformance with Contract Documents.
  - d. Coordination with other work.
2. Notify Architect in writing, at time of submittal, of minor deviations in submittals from requirements of the Contract Documents. Do not submit requests for substitutions as part of this submittal process. Refer to Section of 01 2500 - Substitution Procedures.

#### 1.9 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

- A - NO EXCEPTIONS
- B - EXCEPTIONS AS NOTED
- C - RESUBMIT
- D - REJECTED
- I - FOR INFORMATION ONLY

B. Submittals are reviewed for conformance with the design concept expressed in the Contract Documents. Review is not for the purpose of confirming or approving: (a) deviation from the Contract Documents, including but not limited to deviation with reference to material, quantity, location, quality, dimension, or orientation (except as expressly annotated in writing by the Architect herein), (b) means,

methods, sequences, or techniques of construction (unless expressly called for in the Contract Documents and herein expressly highlighted for review and approval by the Architect), (c) safety of the contractor(s) work, work plan, procedures, workers or of the site, (d) any clarification of a patent or latent ambiguity or defect in the Contract Documents, or (e) the procurement or request for any labor, materials or other expense of the contractor(s) which is in addition to that previously approved by the Owner. The Contractor shall be and shall remain responsible for: (a) compliance with the Contract Documents, (b) coordination of the Work (including amongst various trades), (c) performing the Work in a safe and satisfactory manner, (d) confirming and correlating quantity and dimensions, and (e) the construction schedule.

C. Review and Mark-up:

1. Architect will utilized ADOBE Acrobat for Submittal Review, Mark-Up and Comment:
2. Design Consultants and Architect will coordinate color marking to identify the responsible party for the comments:
  - a. Contractor: Blue
  - b. Design Consultant: Orange
  - c. Architect: Red
3. Architect will to add any comments to the final marked-up set if received by a Design Consultant.
4. Mark-ups and comments will be clouded.
5. Electronic Perkins+Will Stamp will be utilized.

D. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

E. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

F. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

G. Submittals not required by the Contract Documents may be returned by the Architect without action.

- H. Review by Architect of submittals is not an authorization for Change Order. Any item requiring Change Order shall follow procedures described elsewhere in the Contract Documents.

1.10 PROCEDURE FOR RESUBMITTING

- A. Required Revisions: Make corrections or changes in submittals required by Architect and resubmit when Architect's stamp requires resubmittal.
  - 1. Clearly identify changes made other than those requested by Architect by "clouding" or other suitable means acceptable to Architect. Only changes that are "clouded" and changes requested by Architect will be reviewed on a resubmittal. Architect is not responsible for reviewing resubmittals that are not "clouded" on resubmittal.
- B. Resubmittal Review Fees: If Architect rejects (Rejected, Revise and Resubmit) Contractor's submittal more than 2 times for the same Specification Section, due to the submittal not meeting the requirements of the Contract, Architect will be compensated for additional reviews.
  - 1. Amount of such compensation will be incorporated by Change Order and deducted from Contractor's Application for Payment.
- C. Product Submittals: Revise initial submittal to comply with specified requirements.
- D. Contractor is responsible for delays caused by resubmittal process.

- - - E N D - - -

## SUBSTITUTION REQUEST FORM

PROJECT: VA West Los Angeles

(After Contract Award)

TO: Perkins+Will  
617 West 7th Street, Suite 1200  
Los Angeles, CA 90017

FROM: \_\_\_\_\_  
\_\_\_\_\_

NO. \_\_\_\_\_

DATE: \_\_\_\_\_

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Division 01 Section "SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES"

### 1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: \_\_\_\_\_

Specification Section No.: \_\_\_\_\_ Article / Paragraph: \_\_\_\_\_

### 2. REASON FOR SUBSTITUTION REQUEST

#### SPECIFIED PRODUCT . . .

- ☐ Is no longer available.
- ☐ Is unable to meet project schedule.
- ☐ Is unsuitable for the designated application.
- ☐ Cannot interface with adjacent materials.
- ☐ Is not compatible with adjacent materials.
- ☐ Cannot provide the specified warranty.
- ☐ Cannot be constructed as indicated.
- ☐ Cannot be obtained due to one or more of the following:

- ☐ Strike ☐ Bankruptcy of manufacturer or supplier
- ☐ Lockout ☐ Similar occurrence (explain below)

#### PROPOSED PRODUCT . . .

- ☐ Will reduce construction time
- ☐ Will result in cost savings of  
\$ \_\_\_\_\_ to Project
- ☐ Is for supplier's convenience
- ☐ Is for subcontractor's convenience
- ☐ Other: \_\_\_\_\_

### 3. SUPPORTING DATA

- ☐ Drawings, specifications, product data, performance data, test data, and any other necessary information to facilitate review of the Substitution Request is attached.
- ☐ Sample is attached. ☐ Sample will be sent if requested.

#### 4. QUALITY COMPARISON

Provide all necessary side-by-side comparative data as required to facilitate review of Substitution Request:

	SPECIFIED PRODUCT	PROPOSED PRODUCT
Manufacturer:	_____	_____
Name / Brand:	_____	_____
Catalog No.:	_____	_____
Vendor:	_____	_____
Variations:	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

(Add Additional Sheets If Necessary)

Local Distributor or Supplier: \_\_\_\_\_

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: \_\_\_\_\_

Warranty: ☐ Yes ☐ No \_\_\_\_\_ Years

#### 5. PREVIOUS INSTALLATIONS

Identification of at least **four** similar projects on which proposed substitution was used:

##### PROJECT #1:

Project: \_\_\_\_\_

Address: \_\_\_\_\_

Architect: \_\_\_\_\_

Owner: \_\_\_\_\_

Contractor: \_\_\_\_\_

Date Installed: \_\_\_\_\_

PROJECT #2:

Project: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Architect: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Date Installed: \_\_\_\_\_

PROJECT #3:

Project: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Architect: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Date Installed: \_\_\_\_\_

PROJECT #4:

Project: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Architect: \_\_\_\_\_  
Owner: \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Date Installed: \_\_\_\_\_

**Note: All questions must be answered and all blanks filled in.**



## 6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if yes, explain)

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Proposed substitution requires dimensional revisions or redesign of architectural, structural, M-E-P, life safety, or other work:

☐ No ☐ Yes (if yes, attach data explaining revisions)

## 7. STATEMENT OF CONFORMANCE OF REQUEST TO CONTRACT REQUIREMENTS

Contractor and Subcontractor have investigated the proposed substitution and hereby represent that:

- A. They have personally investigated the proposed substitution and believe that it is equal to or superior in all respects to specified product, except as stated above;
- B. The proposed substitution is in compliance with applicable codes and ordinances;
- C. The proposed substitution will provide same warranty as specified for specified product;
- D. They will coordinate the incorporation of the proposed substitution into the Work, and will include modifications to the Work as required to fully integrate the substitution;
- E. They have included complete cost data and implications of the substitution (attached);
- F. They will pay any redesign fees incurred by the Architect or any of the Architect's consultants, and any special inspection costs incurred by the Owner, caused by the use of this product;
- G. They waive all future claims for added cost or time to the Contract related to the substitution, or that become known after substitution is accepted.
- H. The Architect's approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Architect at the time decision is rendered and Addendum is issued; and that Architect's approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

Contractor: \_\_\_\_\_  
(Name of Contractor)

Date: \_\_\_\_\_ By: \_\_\_\_\_

Subcontractor: \_\_\_\_\_  
(Name of Subcontractor)

Date: \_\_\_\_\_ By: \_\_\_\_\_

**Note: Unresponsive or incomplete requests will be rejected and returned without review.**

## 8. ARCHITECT'S REVIEW AND ACTION

- ☐ Substitution is accepted.
- ☐ Substitution is accepted, with the following comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ☐ Resubmit Substitution Request:
  - ☐ Provide more information in the following areas: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - ☐ Provide proposal indicating amount of savings / credit to Owner
  - ☐ Bidding Contractor shall sign Bidder's Statement of Conformance
  - ☐ Bidding Subcontractor shall sign Bidder's Statement of Conformance
- ☐ Substitution is not accepted:
  - ☐ Substitution Request received too late.
  - ☐ Substitution Request received directly from subcontractor or supplier.
  - ☐ Substitution Request not submitted in accordance with requirements.
  - ☐ Substitution Request Form is not properly executed.
  - ☐ Substitution Request does not indicate what item is being proposed.
  - ☐ Insufficient information submitted to facilitate proper evaluation.
  - ☐ Proposed product does not appear to comply with specified requirements.
  - ☐ Proposed product will require substantial revisions to Contract Documents.

### Perkins+Will

By: \_\_\_\_\_ Date: \_\_\_\_\_

Perkins+Will has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the specified product.

**9. OWNER'S REVIEW AND ACTION**

- ☐ Substitution is accepted; Architect to prepare Change Order.
- ☐ Substitution is not accepted.
- ☐ Owner will pay Perkins+Will directly for redesign fees.
- ☐ Include Perkins+Will Additional Service fee for implementing the substitution in the Change Order.

By: \_\_\_\_\_ Date: \_\_\_\_\_  
(Owner's Representative)

**END OF FORM**

**SECTION 01 42 19**  
**REFERENCE STANDARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

**1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)**

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

**1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)**

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARTMENT OF VETERANS AFFAIRS  
Office of Construction & Facilities Management  
Facilities Quality Service (00CFM1A)  
425 Eye Street N.W, (sixth floor)  
Washington, DC 20001  
Telephone Numbers: (202) 632-5249 or (202) 632-5178  
Between 9:00 AM - 3:00 PM

**1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)**

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA Aluminum Association Inc.

<http://www.aluminum.org>

AABC	Associated Air Balance Council <a href="http://www.aabchg.com">http://www.aabchg.com</a>
AAMA	American Architectural Manufacturer's Association <a href="http://www.aamanet.org">http://www.aamanet.org</a>
AAN	American Nursery and Landscape Association <a href="http://www.anla.org">http://www.anla.org</a>
AASHTO	American Association of State Highway and Transportation Officials <a href="http://www.aashto.org">http://www.aashto.org</a>
AATCC	American Association of Textile Chemists and Colorists <a href="http://www.aatcc.org">http://www.aatcc.org</a>
ACGIH	American Conference of Governmental Industrial Hygienists <a href="http://www.acgih.org">http://www.acgih.org</a>
ACI	American Concrete Institute <a href="http://www.aci-int.net">http://www.aci-int.net</a>
ACPA	American Concrete Pipe Association <a href="http://www.concrete-pipe.org">http://www.concrete-pipe.org</a>
ACPPA	American Concrete Pressure Pipe Association <a href="http://www.acppa.org">http://www.acppa.org</a>
ADC	Air Diffusion Council <a href="http://flexibleduct.org">http://flexibleduct.org</a>
AGA	American Gas Association <a href="http://www.aga.org">http://www.aga.org</a>
AGC	Associated General Contractors of America <a href="http://www.agc.org">http://www.agc.org</a>
AGMA	American Gear Manufacturers Association, Inc. <a href="http://www.agma.org">http://www.agma.org</a>
AHAM	Association of Home Appliance Manufacturers <a href="http://www.aham.org">http://www.aham.org</a>
AISC	American Institute of Steel Construction <a href="http://www.aisc.org">http://www.aisc.org</a>
AISI	American Iron and Steel Institute <a href="http://www.steel.org">http://www.steel.org</a>
AITC	American Institute of Timber Construction <a href="http://www.aitc-glulam.org">http://www.aitc-glulam.org</a>
AMCA	Air Movement and Control Association, Inc. <a href="http://www.amca.org">http://www.amca.org</a>
ANLA	American Nursery & Landscape Association <a href="http://www.anla.org">http://www.anla.org</a>
ANSI	American National Standards Institute, Inc. <a href="http://www.ansi.org">http://www.ansi.org</a>

APA	The Engineered Wood Association <a href="http://www.apawood.org">http://www.apawood.org</a>
ARI	Air-Conditioning and Refrigeration Institute <a href="http://www.ari.org">http://www.ari.org</a>
ASAE	American Society of Agricultural Engineers <a href="http://www.asae.org">http://www.asae.org</a>
ASCE	American Society of Civil Engineers <a href="http://www.asce.org">http://www.asce.org</a>
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers <a href="http://www.ashrae.org">http://www.ashrae.org</a>
ASME	American Society of Mechanical Engineers <a href="http://www.asme.org">http://www.asme.org</a>
ASSE	American Society of Sanitary Engineering <a href="http://www.asse-plumbing.org">http://www.asse-plumbing.org</a>
ASTM	American Society for Testing and Materials <a href="http://www.astm.org">http://www.astm.org</a>
AWI	Architectural Woodwork Institute <a href="http://www.awinet.org">http://www.awinet.org</a>
AWS	American Welding Society <a href="http://www.aws.org">http://www.aws.org</a>
AWWA	American Water Works Association <a href="http://www.awwa.org">http://www.awwa.org</a>
BHMA	Builders Hardware Manufacturers Association <a href="http://www.buildershardware.com">http://www.buildershardware.com</a>
BIA	Brick Institute of America <a href="http://www.bia.org">http://www.bia.org</a>
CAGI	Compressed Air and Gas Institute <a href="http://www.cagi.org">http://www.cagi.org</a>
CGA	Compressed Gas Association, Inc. <a href="http://www.cganet.com">http://www.cganet.com</a>
CI	The Chlorine Institute, Inc. <a href="http://www.chlorineinstitute.org">http://www.chlorineinstitute.org</a>
CISCA	Ceilings and Interior Systems Construction Association <a href="http://www.cisca.org">http://www.cisca.org</a>
CISPI	Cast Iron Soil Pipe Institute <a href="http://www.cispi.org">http://www.cispi.org</a>
CLFMI	Chain Link Fence Manufacturers Institute <a href="http://www.chainlinkinfo.org">http://www.chainlinkinfo.org</a>

CPMB	Concrete Plant Manufacturers Bureau <a href="http://www.cpmc.org">http://www.cpmc.org</a>
CRA	California Redwood Association <a href="http://www.calredwood.org">http://www.calredwood.org</a>
CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">http://www.crsi.org</a>
CTI	Cooling Technology Institute <a href="http://www.cti.org">http://www.cti.org</a>
DHI	Door and Hardware Institute <a href="http://www.dhi.org">http://www.dhi.org</a>
EGSA	Electrical Generating Systems Association <a href="http://www.egsa.org">http://www.egsa.org</a>
EEI	Edison Electric Institute <a href="http://www.eei.org">http://www.eei.org</a>
EPA	Environmental Protection Agency <a href="http://www.epa.gov">http://www.epa.gov</a>
ETL	ETL Testing Laboratories, Inc. <a href="http://www.etl.com">http://www.etl.com</a>
FAA	Federal Aviation Administration <a href="http://www.faa.gov">http://www.faa.gov</a>
FCC	Federal Communications Commission <a href="http://www.fcc.gov">http://www.fcc.gov</a>
FPS	The Forest Products Society <a href="http://www.forestprod.org">http://www.forestprod.org</a>
GANA	Glass Association of North America <a href="http://www.cssinfo.com/info/gana.html/">http://www.cssinfo.com/info/gana.html/</a>
FM	Factory Mutual Insurance <a href="http://www.fmglobal.com">http://www.fmglobal.com</a>
GA	Gypsum Association <a href="http://www.gypsum.org">http://www.gypsum.org</a>
GSA	General Services Administration <a href="http://www.gsa.gov">http://www.gsa.gov</a>
HI	Hydraulic Institute <a href="http://www.pumps.org">http://www.pumps.org</a>
HPVA	Hardwood Plywood & Veneer Association <a href="http://www.hpva.org">http://www.hpva.org</a>
ICBO	International Conference of Building Officials <a href="http://www.icbo.org">http://www.icbo.org</a>
ICEA	Insulated Cable Engineers Association Inc. <a href="http://www.icea.net">http://www.icea.net</a>

\ICAC Institute of Clean Air Companies  
<http://www.icac.com>

IEEE Institute of Electrical and Electronics Engineers  
<http://www.ieee.org/>

IMSA International Municipal Signal Association  
<http://www.imsasafety.org>

IPCEA Insulated Power Cable Engineers Association

NBMA Metal Buildings Manufacturers Association  
<http://www.mbma.com>

MSS Manufacturers Standardization Society of the Valve and Fittings Industry Inc.  
<http://www.mss-hq.com>

NAAMM National Association of Architectural Metal Manufacturers  
<http://www.naamm.org>

NAPHCC Plumbing-Heating-Cooling Contractors Association  
<http://www.phccweb.org.org>

NBS National Bureau of Standards  
See - NIST

NBBPVI National Board of Boiler and Pressure Vessel Inspectors  
<http://www.nationboard.org>

NEC National Electric Code  
See - NFPA National Fire Protection Association

NEMA National Electrical Manufacturers Association  
<http://www.nema.org>

NFPA National Fire Protection Association  
<http://www.nfpa.org>

NHLA National Hardwood Lumber Association  
<http://www.natlhardwood.org>

NIH National Institute of Health  
<http://www.nih.gov>

NIST National Institute of Standards and Technology  
<http://www.nist.gov>

NLMA Northeastern Lumber Manufacturers Association, Inc.  
<http://www.nelma.org>

NPA National Particleboard Association  
18928 Premiere Court  
Gaithersburg, MD 20879  
(301) 670-0604

NSF National Sanitation Foundation  
<http://www.nsf.org>



NWDA	Window and Door Manufacturers Association <a href="http://www.nwwda.org">http://www.nwwda.org</a>
OSHA	Occupational Safety and Health Administration Department of Labor <a href="http://www.osha.gov">http://www.osha.gov</a>
PCA	Portland Cement Association <a href="http://www.portcement.org">http://www.portcement.org</a>
PCI	Precast Prestressed Concrete Institute <a href="http://www.pci.org">http://www.pci.org</a>
PPI	The Plastic Pipe Institute <a href="http://www.plasticpipe.org">http://www.plasticpipe.org</a>
PEI	Porcelain Enamel Institute, Inc. <a href="http://www.porcelainenamel.com">http://www.porcelainenamel.com</a>
PTI	Post-Tensioning Institute <a href="http://www.post-tensioning.org">http://www.post-tensioning.org</a>
RFCI	The Resilient Floor Covering Institute <a href="http://www.rfci.com">http://www.rfci.com</a>
RIS	Redwood Inspection Service See - CRA
RMA	Rubber Manufacturers Association, Inc. <a href="http://www.rma.org">http://www.rma.org</a>
SCMA	Southern Cypress Manufacturers Association <a href="http://www.cypressinfo.org">http://www.cypressinfo.org</a>
SDI	Steel Door Institute <a href="http://www.steeldoor.org">http://www.steeldoor.org</a>
IGMA	Insulating Glass Manufacturers Alliance <a href="http://www.igmaonline.org">http://www.igmaonline.org</a>
SJI	Steel Joist Institute <a href="http://www.steeljoist.org">http://www.steeljoist.org</a>
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. <a href="http://www.smacna.org">http://www.smacna.org</a>
SSPC	The Society for Protective Coatings <a href="http://www.sspc.org">http://www.sspc.org</a>
STI	Steel Tank Institute <a href="http://www.steeltank.com">http://www.steeltank.com</a>
SWI	Steel Window Institute <a href="http://www.steelwindows.com">http://www.steelwindows.com</a>
TCA	Tile Council of America, Inc. <a href="http://www.tileusa.com">http://www.tileusa.com</a>

TEMA      Tubular Exchange Manufacturers Association  
<http://www.tema.org>

TPI        Truss Plate Institute, Inc.  
            583 D'Onofrio Drive; Suite 200  
            Madison, WI 53719  
            (608) 833-5900

UBC        The Uniform Building Code  
            See ICBO

UL         Underwriters' Laboratories Incorporated  
<http://www.ul.com>

ULC        Underwriters' Laboratories of Canada  
<http://www.ulc.ca>

WCLIB     West Coast Lumber Inspection Bureau  
            6980 SW Varns Road, P.O. Box 23145  
            Portland, OR 97223  
            (503) 639-0651

WRCLA     Western Red Cedar Lumber Association  
            P.O. Box 120786  
            New Brighton, MN 55112  
            (612) 633-4334

WWPA     Western Wood Products Association  
<http://www.wwpa.org>

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**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
  - 1. Waste Management Plan development and implementation.
  - 2. Techniques to minimize waste generation.
  - 3. Sorting and separating of waste materials.
  - 4. Salvage of existing materials and items for reuse or resale.
  - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
  - 1. Soil.
  - 2. Inerts (e.g., concrete, masonry and asphalt).
  - 3. Clean dimensional wood and palette wood.
  - 4. Green waste (biodegradable landscaping materials).
  - 5. Engineered wood products (plywood, particle board and I-joists, etc).
  - 6. Metal products (e.g., steel, wire, beverage containers, copper).
  - 7. Cardboard, paper and packaging.
  - 8. Bitumen roofing materials.
  - 9. Plastics (eg, ABS, PVC).
  - 10. Carpet and pad.
  - 11. Gypsum board.
  - 12. Insulation.
  - 13. Paint.
  - 14. Fluorescent lamps.

**1.2 RELATED WORK**

- A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

### 1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
1. Excess or unusable construction materials.
  2. Packaging used for construction products.
  3. Poor planning and/or layout.
  4. Construction error.
  5. Over ordering.
  6. Weather damage.
  7. Contamination.
  8. Mishandling.
  9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 75 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.cwm.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

#### **1.4 TERMINOLOGY**

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, e.g. concrete crushed for use as a sub-base in paving.
  2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

#### **1.5 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:

- B. Prepare and submit to the Resident Engineer a written construction waste and demolition debris management plan. The plan shall include, but not be limited to, the following information:
1. Procedures to be used for waste and debris management.
  2. Techniques to be used to minimize waste generation.
  3. Analysis of the estimated job site waste to be generated:
    - a. List of each material and quantity to be salvaged, reused, recycled.
    - b. List of each material and quantity proposed to be taken to a landfill.
  4. Detailed description of the Means and Methods to be used for material handling.
    - a. On site: Material separation, storage, protection where applicable.
    - b. Off site: Transportation means and destination. Include list of materials.
      - 1) Description of materials to be site-separated and self-hauled to designated facilities.
      - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
    - c. The names and locations of mixed debris reuse and recycling facilities or sites.
    - d. The names and locations of trash disposal landfill facilities or sites.
    - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction waste and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

#### **1.7 APPLICABLE PUBLICATIONS**

- A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

B. U.S. Green Building Council (USGBC):

LEED Green Building Rating System for New Construction

**1.8 RECORDS**

- A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. List of each material and quantity to be salvaged, recycled, reused.  
B. List of each material and quantity proposed to be taken to a landfill.  
C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

**PART 3 - EXECUTION**

**3.1 COLLECTION**

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.  
B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to appropriate recycling facility for processing.  
C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

**3.2 DISPOSAL**

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.  
B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

**3.3 REPORT**

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.



- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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**SECTION 01 91 00**

**GENERAL COMMISSIONING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 COMMISSIONING DESCRIPTION**

- A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.
- B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 14 and Division 26 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.
- C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.
- D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 14 and Division 26 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.
- E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy

phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
  2. Verify and document proper integrated performance of equipment and systems.
  3. Verify that Operations & Maintenance documentation is complete.
  4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
  5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
  6. Document the successful achievement of the commissioning objectives listed above.
- F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

## **1.2 CONTRACTUAL RELATIONSHIPS**

- A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the Resident Engineer as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.
- B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Resident Engineer and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the Resident Engineer and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the Resident Engineer.
- C. Whole Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication

and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and Resident Engineer. Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and the Contractor.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the Resident Engineer and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. In the event that any Commissioning Issues and suggested resolutions are deemed by the Resident Engineer to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or Resident Engineer will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the Resident Engineer of any issues that they deem to constitute a potential contract change prior to acting on these issues.
5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or Resident Engineer, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

### 1.3 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 32.16.15 PROJECT SCHEDULES (SMALL PROJECTS - DESIGN/BID/BUILD)
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- D. Section 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS.

### 1.4 SUMMARY

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

### 1.5 ACRONYMS

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)
COR	Contracting Officer's Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes

List of Acronyms	
Acronym	Meaning
HVAC	Heating, Ventilation, and Air Conditioning
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery
NCA	Department of Veterans Affairs National Cemetery Administration
NEBB	National Environmental Balancing Bureau
O&M	Operations & Maintenance
OPR	Owner's Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
TAB	Test Adjust and Balance
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management
VACO	VA Central Office
VA PM	VA Project Manager
VA-RE	VA Resident Engineer
USGBC	United States Green Building Council

## 1.6 DEFINITIONS

**Acceptance Phase Commissioning:** Commissioning tasks executed after most construction has been completed, most Site Observations and Static Tests have been completed and Pre-Functional Testing has been completed and accepted. The main commissioning activities performed during this phase are verification that the installed systems are functional by conducting Systems Functional Performance tests and Owner Training.

**Accuracy:** The capability of an instrument to indicate the true value of a measured quantity.

**Back Check:** A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review

**Basis of Design (BOD):** The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these

documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

**Benchmarks:** Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself.. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

**Building Information Modeling (BIM):** Building Information Modeling is a parametric database which allows a building to be designed and constructed virtually in 3D, and provides reports both in 2D views and as schedules. This electronic information can be extracted and reused for pre-populating facility management CMMS systems. Building Systems Commissioning (BSC): NEBB acronym used to designate its commissioning program.

**Calibrate:** The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.

**CCTV:** Closed circuit Television. Normally used for security surveillance and alarm detections as part of a special electrical security system.

**COBie:** Construction Operations Building Information Exchange (COBie) is an electronic industry data format used to transfer information developed during design, construction, and commissioning into the Computer Maintenance Management Systems (CMMS) used to operate facilities. See the Whole Building Design Guide website for further information (<http://www.wbdg.org/resources/cobie.php>)

**Commissionability:** Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned

**Commissioning Agent (CxA):** The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.

**Commissioning Checklists:** Lists of data or inspections to be verified to ensure proper system or component installation, operation, and



function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

**Commissioning Design Review:** The commissioning design review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency, control systems' sequence of operations including building automation system features; commissioning specifications and the ability to functionally test the systems.

**Commissioning Issue:** A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also - Commissioning Observation).

**Commissioning Manager (CxM):** A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.

**Commissioning Observation:** An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)

**Commissioning Plan:** A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.

**Commissioning Process:** A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

**Commissioning Report:** The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.

**Commissioning Representative (CxR):** An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.

**Commissioning Specifications:** The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.

**Commissioning Team:** Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.

**Construction Phase Commissioning:** All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

**Contract Documents (CD):** Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings, specifications and all applicable contract modifications or supplements.

**Construction Phase Commissioning (CPC):** All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

**Coordination Drawings:** Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel, ductwork, major piping and electrical conduit and show the elevations and locations of the above components.

**Data Logging:** The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.

**Deferred System Test:** Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.

**Deficiency:** See "Commissioning Issue".

**Design Criteria:** A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.

**Design Intent:** The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are utilized to provide a written record of these ideas, concepts and criteria.

**Design Narrative:** A written description of the proposed design solutions that satisfy the requirements of the OPR.

**Design Phase Commissioning (DPC):** All commissioning tasks executed during the design phase of the project.

**Environmental Systems:** Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and dehumidification for the purpose of human comfort or process control of temperature and humidity.

**Executive Summary:** A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.

**Functionality:** This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.

**Functional Test Procedure (FTP):** A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

**Industry Accepted Best Practice:** A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.

**Installation Verification:** Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

**Integrated System Testing:** Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper

functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

Issues Log: A formal and ongoing record of problems or concerns - and their resolution - that have been raised by members of the Commissioning Team during the course of the Commissioning Process.

**Lessons Learned Workshop:** A workshop conducted to discuss and document project successes and identify opportunities for improvements for future projects.

**Maintainability:** A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.

**Manual Test:** Testing using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

**Owner's Project Requirements (OPR):** A written document that details the project requirements and the expectations of how the building and its systems will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

**Peer Review:** A formal in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning review. The VA usually hires an independent third-party (called the IDIQ A/E) to conduct peer reviews.

**Precision:** The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an

instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

**Pre-Design Phase Commissioning:** Commissioning tasks performed prior to the commencement of design activities that includes project programming and the development of the commissioning process for the project

**Pre-Functional Checklist (PFC):** A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.

**Pre-Functional Test (PFT):** An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

**Procedure or Protocol:** A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.

**Range:** The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.

**Resolution:** This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.

**Site Observation Visit:** On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

**Site Observation Reports (SO):** Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.

**Special System Inspections:** Inspections required by a local code authority prior to occupancy and are not normally a part of the commissioning process.

**Static Tests:** Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.

**Start Up Tests:** Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.

**Systems Manual:** A system-focused composite document that includes all information required for the owners operators to operate the systems.

**Test Procedure:** A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

**Testing:** The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.

**Testing, Adjusting, and Balancing (TAB):** A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

**Thermal Scans:** Thermographic pictures taken with an Infrared Thermographic Camera. Thermographic pictures show the relative temperatures of objects and surfaces and are used to identify leaks, thermal bridging, thermal intrusion, electrical overload conditions, moisture containment, and insulation failure.

**Training Plan:** A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.

**Trending:** Monitoring over a period of time with the building automation system.

**Unresolved Commissioning Issue:** Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. **Validation:** The process by which work is verified as complete and operating correctly:

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the

- resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

**Verification:** The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

**Warranty Phase Commissioning:** Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes follow-up on verification of system performance, measurement and verification tasks and assistance in identifying warranty issues and enforcing warranty provisions of the construction contract.

**Warranty Visit:** A commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

**Whole Building Commissioning:** Commissioning of building systems such as Building Envelope, HVAC, Electrical, Special Electrical (Fire Alarm, Security & Communications), Plumbing and Fire Protection as described in this specification.

#### 1.7 SYSTEMS TO BE COMMISSIONED

- A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.
- B. The following systems will be commissioned as part of this project:

Systems To Be Commissioned	
System	Description
Elevators	Interface with other systems (fire alarm, etc.) [ASTM testing and certification by others]
Electrical	

<b>Systems To Be Commissioned</b>	
<b>System</b>	<b>Description</b>
Medium-Voltage Electrical Distribution Systems	Medium-Voltage Switchgear, Medium-Voltage Switches, Underground ductbank and distribution, Pad-Mount Transformers, Medium-Voltage Load Interrupter Switches,
Grounding & Bonding Systems	Witness 3rd party testing, review reports
Electric Power Monitoring Systems	Metering, sub-metering, power monitoring systems, PLC control systems
Electrical System Protective Device Study	Review reports, verify field settings consistent with Study
Secondary Unit Substations	Medium-voltage components, transformers, low-voltage distribution, verify breaker testing results (injection current, etc)
Low-Voltage Distribution System	Normal power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, switchboards, distribution panels, panelboards, verify breaker testing results (injection current, etc)
Emergency Power Generation Systems	Generators, Generator paralleling switchgear, automatic transfer switches, PLC and other control systems
Lighting & Lighting Control** Systems	Emergency lighting, occupancy sensors, lighting control systems, architectural dimming systems, theatrical dimming systems, exterior lighting and controls
Cathodic Protection Systems	Review 3rd party testing results.
Lightning Protection System	Witness 3rd party testing, review reports
<b>Integrated Systems Tests</b>	



Systems To Be Commissioned	
System	Description
Loss of Power Response	Loss of power to building, loss of power to campus, restoration of power to building, restoration of power to campus.
Fire Alarm Response	Integrated System Response to Fire Alarm Condition and Return to Normal

#### 1.8 COMMISSIONING TEAM

- A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.
- B. Members Appointed by Contractor:
1. Contractor' Commissioning Manager: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
  2. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions.
- C. Members Appointed by VA:
1. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. The VA will engage the CxA under a separate contract.
  2. User: Representatives of the facility user and operation and maintenance personnel.
  3. A/E: Representative of the Architect and engineering design professionals.

#### 1.9 VA'S COMMISSIONING RESPONSIBILITIES

- A. Appoint an individual, company or firm to act as the Commissioning Agent.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:

1. Coordination meetings.
  2. Training in operation and maintenance of systems, subsystems, and equipment.
  3. Testing meetings.
  4. Witness and assist in Systems Functional Performance Testing.
  5. Demonstration of operation of systems, subsystems, and equipment.
- C. Provide the Construction Documents, prepared by Architect and approved by VA, to the Commissioning Agent and for use in managing the commissioning process, developing the commissioning plan, systems manuals, and reviewing the operation and maintenance training plan.

#### **1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES**

- A. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.
- B. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.
- C. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
  1. Participate in commissioning coordination meetings.
  2. Conduct operation and maintenance training sessions in accordance with approved training plans.
  3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
  4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
  5. Review and comment on commissioning documentation.
  6. Participate in meetings to coordinate Systems Functional Performance Testing.

7. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to Commissioning Agent for incorporation into the commissioning plan.
8. Provide information to the Commissioning Agent for developing commissioning plan.
9. Participate in training sessions for VA's operation and maintenance personnel.
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

#### **1.11 COMMISSIONING AGENT'S RESPONSIBILITIES**

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.
- C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.
- D. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.
- E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- F. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility

for maintenance and component replacement or repair, and for general conformance with the Construction Documents.

- G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
- H. Coordinate Systems Functional Performance Testing schedule with the Contractor.
- I. Witness selected systems startups.
- J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
- K. Witness and document Systems Functional Performance Testing.
- L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00 GENERAL REQUIREMENTS.
- N. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.
- O. Prepare commissioning Field Observation Reports.
- P. Prepare the Final Commissioning Report.
- Q. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
- R. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

#### **1.12 COMMISSIONING DOCUMENTATION**

- A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation

requirements of the commissioning process, and shall include, but is not limited, to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
  2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
  3. Identification of systems and equipment to be commissioned.
  4. Schedule of Commissioning Coordination meetings.
  5. Identification of items that must be completed before the next operation can proceed.
  6. Description of responsibilities of commissioning team members.
  7. Description of observations to be made.
  8. Description of requirements for operation and maintenance training.
  9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
  10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
  11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
  12. Preliminary Systems Functional Performance Test procedures.
- B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test

procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
  2. Test number.
  3. Time and date of test.
  4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
  5. Dated signatures of the person performing test and of the witness, if applicable.
  6. Individuals present for test.
  7. Observations and Issues.
  8. Issue number, if any, generated as the result of test.
- C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.
- D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.
- E. Corrective Action Documents: The Commissioning Agent will document corrective action taken for systems and equipment that fail tests. The documentation will include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent will witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.
- F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues

and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.

1. Creating an Commissioning Issues Log Entry:

- a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
- b. Assign a descriptive title for the issue.
- c. Identify date and time of the issue.
- d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
- e. Identify system, subsystem, and equipment to which the issue applies.
- f. Identify location of system, subsystem, and equipment.
- g. Include information that may be helpful in diagnosing or evaluating the issue.
- h. Note recommended corrective action.
- i. Identify commissioning team member responsible for corrective action.
- j. Identify expected date of correction.
- k. Identify person that identified the issue.

2. Documenting Issue Resolution:

- a. Log date correction is completed or the issue is resolved.
- b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
- c. Identify changes to the Contract Documents that may require action.
- d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
- e. Identify person(s) who corrected or resolved the issue.
- f. Identify person(s) verifying the issue resolution.

G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
2. Commissioning plan.
3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
5. Commissioning Issues Log.
6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

H. Addendum to Final Commissioning Report: The Commissioning Agent will prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum will indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:

1. Documentation of deferred and off season test(s) results.
2. Completed Systems Functional Performance Test Procedures for off season test(s).
3. Documentation that unresolved system performance issues have been resolved.



4. Updated Commissioning Issues Log, including status of unresolved issues.
  5. Identification of potential Warranty Claims to be corrected by the Contractor.
- I. Systems Manual: The Commissioning Agent will gather required information and compile the Systems Manual. The Systems Manual will include, but is not limited to, the following:
1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
  2. Reference to Final Commissioning Plan.
  3. Reference to Final Commissioning Report.
  4. Approved Operation and Maintenance Data as submitted by the Contractor.

#### **1.13 SUBMITTALS**

- A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:
1. The Commissioning Team: A list of commissioning team members by organization.
  2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).
  3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
  4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.

5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
  6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
  7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system's testing.
- B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor's project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.
- C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.
- D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.
- E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.

- F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA Resident Engineer with copies to the Contractor and Architect.
- G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.
- H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.
- I. Data for Commissioning:
  - 1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
  - 2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

#### **1.14 COMMISSIONING PROCESS**

- A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.
- B. Within **//XX//** days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort on behalf of the Contractor. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services by the Contractor.
- C. Within **//XX//** days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related

tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

#### **1.15 QUALITY ASSURANCE**

- A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

#### **1.16 COORDINATION**

- A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.
- C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The

Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.

- D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.
- F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

## **PART 2 - PRODUCTS**

### **2.1 TEST EQUIPMENT**

- A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing will be identified in the detailed System Functional Performance Test Procedure prepared by the Commissioning Agent.
- B. Data logging equipment and software required to test equipment shall be provided by the Contractor.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 °C (1.0 °F) and a resolution of + or - 0.1 °C (0.2 °F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's

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recommended intervals and following any repairs to the equipment.  
Calibration tags shall be affixed or certificates readily available.

### PART 3 - EXECUTION

#### 3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

A. The following table outlines the roles and responsibilities for the Commissioning Team members during the Construction Phase:

Spec Writer's Notes: Edit the following tables to describe the roles and responsibilities for each commissioning team member for each of the commissioning tasks as appropriate for the project.

Construction Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Construction Commissioning Kick Off meeting	L	A	P	P	O	
	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Controls Meeting	L	A	P	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support the OPR and BOD.	L	A	P	P	N/A	
Cx Plan & Spec	Final Commissioning Plan	L	A	R	R	O	
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	

Construction Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	TAB Plan Review	L	A	R	R	O	
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	L	A	R	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	L	A	R	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	



Construction Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

B. The following table outlines the roles and responsibilities for the Commissioning Team members during the Acceptance Phase:

Acceptance Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	P	A	P	L	O	
	Pre-Test Coordination Meeting	L	A	P	P	O	
	Lessons Learned and Commissioning Report Review Meeting	L	A	P	P	O	

Acceptance Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	L	P	P	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
OPR and BOD	Maintain OPR on behalf of Owner	L	A	R	R	O	
	Maintain BOD/DID on behalf of Owner	L	A	R	R	O	
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Review Operations & Maintenance Manuals	L	A	R	R	R	
	Training Plan Review	L	A	R	R	R	
	Warranty Review	L	A	R	R	O	
	Review TAB Report	L	A	R	R	O	
Site Observations	Construction Observation Site Visits	L	A	R	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	

Acceptance Phase		CxA = Commissioning Agent RE = Resident Engineer A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L = Lead P = Participate A = Approve R = Review O = Optional
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Functional Test Protocols	TAB Verification	L	A	R	R	O	
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	L	S	R	P	P	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	L	A	R	R	R	

C. The following table outlines the roles and responsibilities for the Commissioning Team members during the Warranty Phase:

Warranty Phase		CxA = Commissioning Agent					L = Lead
Commissioning Roles & Responsibilities		RE = Resident Engineer					P = Participate
		A/E = Design Arch/Engineer					A = Approve
		PC = Prime Contractor					R = Review
		O&M = Gov't Facility O&M					O = Optional
Category	Task Description	CxA	RE	A/E	PC	O&M	Notes
Meetings	Post-Occupancy User Review Meeting	L	A	O	P	P	
Site Observations	Periodic Site Visits	L	A	O	O	P	
Functional Test Protocols	Deferred and/or seasonal Testing	L	A	O	P	P	
Technical Activities	Issues Resolution Meetings	L	S	O	O	P	
	Post-Occupancy Warranty Checkup and review of Significant Outstanding Issues	L	A		R	P	
Reports and Logs	Final Commissioning Report Amendment	L	A		R	R	
	Status Reports	L	A		R	R	

### **3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS**

A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
  - a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
  - b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.
2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
  - a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
  - b. The full startup plan shall at a minimum consist of the following items:
    - 1) The Pre-Functional Checklists.
    - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
    - 3) The manufacturer's normally used field checkout sheets.

- c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
  - d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.
3. Sensor and Actuator Calibration
- a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 14 and Division 26 specifications.
  - b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
4. Execution of Equipment Startup
- a. **//Four// //insert number//** weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
  - b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
  - c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
  - d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

### **3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP**

- A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.
- B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to

correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.

- C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

### **3.4 PHASED COMMISSIONING**

- A. The project may require startup and initial checkout to be executed in phases. This phasing shall be planned and scheduled in a coordination meeting of the VA, Commissioning Agent, and the Contractor. Results will be added to the master construction schedule and the commissioning schedule.

### **3.5 DDC SYSTEM TRENDING FOR COMMISSIONING (NOT USED)**

### **3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING**

- A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.
- B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.

D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms developed by the Commissioning Agent will include, but not be limited to, the following information:

1. System and equipment or component name(s)
2. Equipment location and ID number
3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment
4. Date
5. Project name
6. Participating parties
7. A copy of the specification section describing the test requirements
8. A copy of the specific sequence of operations or other specified parameters being verified
9. Formulas used in any calculations



10. Required pretest field measurements
  11. Instructions for setting up the test.
  12. Special cautions, alarm limits, etc.
  13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
  14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
  15. A section for comments.
  16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.
- E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.
1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
  2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
  3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.
  5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.
- F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.
- G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.
- H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the

completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the VA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

### **3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS**

A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.

B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.

2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
  - a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor's response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.
  - b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
  - a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
  - b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.

- c. The Commissioning Agent will document the resolution process.
  - d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.
- C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:
- 1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
  - 2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
  - 3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
  - 4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.

5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the VA. The Commissioning Agent will evaluate each test and report to the VA using a standard form. The VA will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

### **3.8 DEFERRED TESTING**

- A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.
- B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent will review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

### **3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS**

- A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent will convene a training preparation

conference to include VA's Resident Engineer, VA's Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.

- B. The Contractor shall provide training and demonstration as required by other Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 sections. The Training and Demonstration shall include, but is not limited to, the following:
1. Review the Contract Documents.
  2. Review installed systems, subsystems, and equipment.
  3. Review instructor qualifications.
  4. Review instructional methods and procedures.
  5. Review training module outlines and contents.
  6. Review course materials (including operation and maintenance manuals).
  7. Review and discuss locations and other facilities required for instruction.
  8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
  9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
- C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
  2. Qualification Data: Submit qualifications for facilitator and/or instructor.
  3. Attendance Record: For each training module, submit list of participants and length of instruction time.
  4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

5. Demonstration and Training Recording:

- a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
  - b. Video Format: Provide high quality color DVD color on standard size DVD disks.
  - c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
  - d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
  - e. Submit two copies within seven days of end of each training module.
6. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

D. Quality Assurance:

1. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
2. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
3. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

E. Training Coordination:



1. Coordinate instruction schedule with VA's operations. Adjust schedule as required to minimize disrupting VA's operations.
2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the VA.

F. Instruction Program:

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
  - a. Fire protection systems, including fire alarm, fire pumps, and fire suppression systems.
  - b. Intrusion detection systems.
  - c. Conveying systems, including elevators, wheelchair lifts, escalators, and automated materials handling systems.
  - d. Electrical service and distribution, including switchgear, transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
  - e. Packaged engine generators, including synchronizing switchgear/switchboards, and transfer switches.
  - f. Lighting equipment and controls.

G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participants are expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria:

Include the following:

  - a. System, subsystem, and equipment descriptions.
  - b. Performance and design criteria if Contractor is delegated design responsibility.
  - c. Operating standards.
  - d. Regulatory requirements.
  - e. Equipment function.
  - f. Operating characteristics.

- g. Limiting conditions.
- H, Performance curves.
- 2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project Record Documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
- 3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.

- c. Noise and vibration adjustments.
- d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.
- H. Training Execution:
  - 1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.
  - 2. Instruction:
    - a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.
    - b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

- 1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  - 2) The VA will furnish an instructor to describe VA's operational philosophy.
  - 3) The VA will furnish the Contractor with names and positions of participants.
3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.
  4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.
  5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.
- I. Demonstration and Training Recording:
1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
  2. Video Format: Provide high quality color DVD color on standard size DVD disks.
  3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
  4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

----- END -----

**SECTION 02 41 19**  
**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies selective demolition and removal of portions of buildings.

**1.2 RELATED WORK:**

- A. Safety Requirements: GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- E. Construction Waste Management: Section 017419 CONSTRUCTION WASTE MANAGEMENT.
- F. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

**1.3 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Qualification Data: For refrigerant recovery technician.
- C. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- F. Predemolition Photographs or Video: Submit before Work begins.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- H. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

**1.5 PROTECTION:**

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- C. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:

1. Maintain at least one stairway in each structure in usable condition to highest remaining floor. Keep stairway free of obstructions and debris until that level of structure has been removed.
  2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
  3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Resident Engineer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Resident Engineer's approval.
- G. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 DEMOLITION:**

- A. Demolish and remove portions of buildings and structures indicated, including all appurtenances related or connected thereto.
- B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center site to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

- C. Remove and legally dispose of demolished materials, other than materials to remain as part of project work. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Resident Engineer. When Utility lines are encountered that are not indicated on the drawings, the Resident Engineer shall be notified prior to further work in that area.

**3.2 CLEAN-UP:**

- A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to Resident Engineer. Clean-up shall include disposal of all items and materials off the Medical Center not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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**SECTION 09 06 00  
SCHEDULE FOR FINISHES**

**PART I - GENERAL**

**1.1 DESCRIPTION**

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

**1.2 MANUFACTURERS**

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

**1.3 SUBMITALS**

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES—provide quadruplicate samples for color approval of materials and finishes specified in this section.

**1.4 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. MASTER PAINTING INSTITUTE: (MPI)  
Architectural Painting Specification Manual - 2010 Edition

**PART 2- PRODUCTS**

**2.1 DIVISION 09 - FINISHES**

A. SECTION 09 65 13, RESILIENT BASE AND ACCESSORIES

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
RBR-1	4" (H)	Rubber base	Match Existing	Coved rubber base - Color: Match Existing

B. SECTION 09 66 16, Terrazzo Floor Tile

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
TZT-1		Terrazzo Tile	Fritztile	#RG2000 Custom Color: 1-21-11-F

C. SECTION 09 72 16, VINYL-COATED FABRIC WALL COVERINGS

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
VWC-1		Vinyl Wallcovering	Match Existing	Match Existing

D. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

		Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and	max 10 units
Gloss Level 2	a high side sheen flat-"a velvet-like" finish	max 10 units, and	10-35 units
Gloss Level 3	a traditional "egg-shell like" finish	10-25 units, and	10-35 units
Gloss Level 4	a "satin-like" finish	20-35 units, and	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	
Gloss Level 6	a traditional gloss	70-85 units	
Gloss level 7	a high gloss	more than 85 units	

Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
PTE-1	Match Existing		Match Existing

## 2.14 DIVISION 14 - CONVEYING EQUIPMENT

### A. SECTION 14 26 26, GEARLESS TRACTION ELEVATORS

Elevator	Component	Material	Finish	Color
Service Elevators	Hoistway Entrance	Stainless Steel	Satin No.4	N/A
	Hoistway Doors	Stainless Steel	Satin No.4	N/A
	Corr. Pos. Indicator and Call Buttons	Manufacturer standard	Manufacturer standard	Manufacturer standard
	Car Canopy	Stainless Steel	Satin No.4	N/A
	Car Wainscot	Stainless Steel	Textured (match existing)	N/A
	Panels Above Wainscot	Stainless Steel	Textured (match existing)	N/A
	Car Floor	Stainless Steel	Diamond Plate (match existing)	N/A
	Car Operating Panel	Stainless Steel	Satin No.4	N/A

Elevator	Component	Material	Finish	Color
Passenger Elevators	Hoistway Entrance	Stainless Steel	Satin No.4	N/A
	Hoistway Doors	Stainless Steel	Satin No.4	N/A
	Corr. Pos. Indicator and Call Buttons	Manufacturer standard	Manufacturer standard	Manufacturer standard
	Car Canopy	Stainless Steel	Satin No.4	N/A
	Car Wainscot	Stainless Steel	Satin No.4	N/A
	Panels Above Wainscot	Plastic Laminate	Wilsonart	Pewter Mesh 4878-38
	Car Floor	TZT-1	See Section 09 66 16	
	Car Operating Panel	Stainless Steel	Satin No.4	N/A

ELEVATOR RETROFIT BLDG 500  
VA WEST LOS ANGELES  
100% CONSTRUCTION DOCUMENTS

PERKINS+WILL  
712020.000  
03/13/2013

**PART III EXECUTION**

**3.1 ROOM FINISH SCHEDULE**

REFER TO SHEETS FOR FINISHES

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**SECTION 09 65 13**  
**RESILIENT BASE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the installation of vinyl or rubber base.

**1.2 RELATED WORK**

- A. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Integral base with sheet flooring: Section 09 65 16, RESILIENT SHEET FLOORING and 09 66 16 TERRAZZO FLOOR TILE.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Description of each product.
  2. Base and stair material manufacturer's recommendations for adhesives.
  3. Application and installation instructions.
- C. Samples:
1. Base: 150 mm (6 inches) long, each type and color.
  2. Resilient Stair Treads: 150 mm (6 inches) long.
  3. Sheet Rubber Flooring: 300 mm (12 inches) square.
  4. Adhesive: Literature indicating each type.

**1.4 DELIVERY**

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

**1.5 STORAGE**

- A. Store materials in weather tight and dry storage facility.
- B. Protect material from damage by handling and construction operations before, during, and after installation.

**1.6 APPLICABLE PUBLICATIONS**

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
- F1344-10.....Rubber Floor Tile
  - F1859-10.....Rubber Sheet Floor Covering without Backing
  - F1860-10.....Rubber Sheet Floor Covering with Backing

F1861-08.....Resilient Wall Base

C. Federal Specifications (Fed. Spec.):

RR-T-650E.....Treads, Metallic and Non-Metallic, Nonskid

## **PART 2 - PRODUCTS**

### **2.2 GENERAL**

A. Use only products by the same manufacturer and from the same production run.

### **2.3 RESILIENT BASE**

- A. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 inches) high, Thermoplastics, Group 2-layered. Style B-cove.
- B. Where carpet occurs, use Style A-straight.
- C. Use only one type of base throughout.

### **2.7 ADHESIVES**

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Adhesives: VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Cove Base Adhesives 50.
- C. Adhesives and sealants shall contain no carcinogen or reproductive toxicant components present at more than 1% of total mass of the product as defined in the California Office of Environmental Health Hazard Assessment's (OEHHA) list entitled "Chemicals Known to the State to Cause Cancer" or the Reproductive Toxicity, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

## **PART 3 - EXECUTION**

### **3.1 PROJECT CONDITIONS**

- A. Maintain temperature of materials above 21° C (70 °F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21° C and 27° C (70°F and 80°F) for at least 48 hours, before, during, and after installation.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

### **3.2 INSTALLATION REQUIREMENTS**

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Resident Engineer.

- B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.
- C. The Resident Engineer reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.

### **3.3 PREPARATION**

- A. Examine surfaces on which material is to be installed.
- B. Fill cracks, pits, and dents with leveling compound.
- C. Level to 3 mm (1/8 inch) maximum variations.
- D. Do not use adhesive for leveling or filling.
- E. Grind, sand, or cut away protrusions; grind high spots.
- F. Clean substrate area of oil, grease, dust, paint, and deleterious substances.
- G. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.

### **3.4 BASE INSTALLATION**

- A. Location:
  - 1. Unless otherwise specified or shown, where base is scheduled, install base over toe space of base of casework, lockers, laboratory, pharmacy furniture island cabinets and where other equipment occurs.
  - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
  - 1. Apply adhesive uniformly with no bare spots.
  - 2. Set base with joints aligned and butted to touch for entire height.
  - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
    - a. Short pieces to save material will not be permitted.
    - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
  - 1. Score back of outside corner.
  - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

### **3.7 CLEANING AND PROTECTION**

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

- B. Keep traffic off resilient material for at least 72 hours after installation.
- C. Clean and polish materials in the following order:
  - 1. After two weeks, scrub resilient base with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue. Polish resilient base to a gloss finish.

- - - E N D - - -



**SECTION 09 66 16**  
**TERRAZZO FLOOR TILE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

Terrazzo tile for installation over existing elevator plywood floors.

**1.2 RELATED WORK**

- A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.
- B. Concrete floors: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- D. Color and Pattern: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 MANUFACTURER'S QUALIFICATIONS**

- A. Approval by Contracting Officer is required of products or service, or proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
  - 1. Manufacturer regularly and presently manufactures terrazzo tile as one of his principal products.
  - 2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items. Approval will not be given, however, where experience record is one of unsatisfactory performance.
  - 3. Manufacturer's product submitted has been in satisfactory and efficient operation on three installations similar or equivalent to this project for three years. Submit list of installations. List shall include name of project, and owner and location of project.

**1.4 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Flooring Manufacturer's Literature and Data: Printed installation instructions for conditions indicated.
- C. Certificates: Indicating materials conform to specified requirements. Indicating flooring manufacturer's approval of underlayment, adhesive and cleaners.
- D. Samples: Terrazzo Tile (each color and pattern to be used) and each color, 150 mm (6 inch) length

**1.5 DELIVERY**

Deliver materials to job in manufacturer's original unopened containers, free of damage, with manufacturer's brand name marked thereon.

## **1.6 STORAGE**

Store materials in a protected area. Storage area shall be kept dry and temperature of storage area shall not be lower than 10 degrees C (50 degrees F) or higher than 32 degrees C (90 degrees F).

## **1.7 PROJECT CONDITIONS**

Tiles shall not be installed until all other work that could cause damage to the finish flooring has been completed. Maintain a temperature of not less than 21 degrees C (70 degrees F) in spaces where tile is to be installed for at least 48 hours before, during and after the laying of tiles. Bring tile into such spaces and allow it to condition at not less than 21 degrees C (70 degrees F) at least 48 hours before installing. A minimum temperature of 13 degrees C (55 degrees F) shall be maintained thereafter.

## **1.8 WARRANTY**

Terrazzo tile is subject to terms of "Warranty of Construction" FAR clause 52.246-21, except that warranty period is two years in lieu of one year.

## **1.9 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing And Materials (ASTM):
  - C109-08.....Compressive Strength of Hydraulic Cement Mortars
  - D2047-04.....Static Coefficient of Friction of Polish Coated  
Floor Surfaces as Measured by the James Machine
  - E648-10.....Critical Radiant Flux of Floor Covering Systems  
Using a Radiant Heat Energy Source
- C. Military Specifications (Mil. Spec.):
  - MIL-D-3134J.....Deck Covering Materials

## **PART 2 - PRODUCTS**

### **2.1 TERRAZZO TILE**

Terrazzo tile shall consist of marble or granite chips embedded in a flexible thermo-set resin matrix. Tiles shall be 5 mm (3/16-inch) thick, and nominal 300 x 300 mm (12 inches by 12 inches) square. Tiles shall have a smooth polished finish with uniform color distribution of chips. Tile shall have the following properties.

TABLE I - MARBLE TERRAZZO TILE		
// PROPERTY	TEST METHOD	VALUE
Compressive strength Water absorption Hardness	ASTM 109 Mil.Spec.MIL-D-3134 Barcol Hardness	51.7 Mpa (7500 psi) minimum 0.4 percent maximum Resin 78, Marble at 25 degrees C 55-85
Coefficient of Friction Flame Resistance	ASTM D2047 ASTM E645	0.70 0.45 watt/cm square minimum //

TABLE II GRANITE TERRAZZO TILE		
Compressive strength Water absorption Hardness at 25 degrees C	ASTM C109 Mil. Spec. MIL-D-3134 Barcol Hardness	35.8 MPa (5,200 psi) 0.4 percent maximum Resin 70, 55-85
Coefficient of Friction Flame Resistance minimum//	ASTM D2047 ASTM E648	0.70 0.45 watt/cm square

## 2.2 ADHESIVE

Shall be terrazzo tile manufacturer's standard product or a product recommended by the terrazzo tile manufacturer.

## 2.3 WALL BASE

See Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

## 2.4 METAL EDGE STRIPS

Extruded aluminum, butt-type, approximately 38 mm (1-1/2 inches) wide with thickness to set top surface flush with top of tile and with bevel at exposed edge. Edge strips shall have countersunk holes, near each end and spaced at no more than 300 mm (8 inches) on center for securement.

## PART 3 - EXECUTION

### 3.1 GENERAL

Provide flooring and base on floor surfaces and walls where shown on the drawings. Provide resilient base as scheduled for room or space, for freestanding columns, pilasters, furred spaces convectors and where shown. Except as necessary to install new tile, keep all traffic off new tile for at least 24 hours after installation.

### 3.2 SUBSTRATE PREPARATION

- C. Existing Elevator Floors: Single construction or badly warped floors shall be covered with exterior grade plywood.

### 3.3 MOISTURE TEST

After concrete floor surfaces have been cleaned, spread small patches of adhesive to be used, in several locations in each room and allow to dry overnight. If the adhesive can be peeled easily from the floor surfaces, the floor is not sufficiently dry. The test shall be repeated until the adhesive adheres properly. Lay tile flooring when the adhesive adheres tightly to the subfloor.

### 3.4 INSTALLATION

- A. Install tile in accordance with the tile manufacturer's approved installation instructions, except as specified herein. Lay design symmetrical about center lines of rooms. Joints shall be tight, and inconspicuous as possible, and in true alignment. Cut tile to fit snugly at pipes and other fixed vertical surfaces. Seal joints at pipes with adhesive. Remove spots or smears of adhesive immediately. Make entire surfaces of finished tile floors smooth, straight, and free from bleeding adhesive, buckles, waves or projecting tile edges upon completion. Remove any surface film on back of base due to mold release agents as recommended by base manufacturer, before applying base adhesive.
1. Where metal edge strip // transition strip // is required, install as detailed.
  2. Bleeding of adhesive on finished floors is considered cause for rejection. Replace damaged tiles.
- B. Metal Edge Strips: Secure strips with No. 10 aluminum alloy, counter sunk flathead machine screws with expansion sleeves. Provide metal edge strips, in one piece, at any exposed edges of tile.
- C. Transition Strips: Apply transition strips with adhesive continuous, between ceramic tile finish floors and resilient tile finish floors as shown.
- D. Premolded Base: Install as specified in Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

### 3.5 CLEANING

Upon completion of the installation, and after adhesive has cured, clean flooring in accordance with manufacturer's recommendations.

### **3.6 PROTECTION**

From the time of laying until acceptance, protect the flooring from damage. Replace damaged, loose, broken, or curled tiles.

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**SECTION 09 72 16**  
**VINYL-COATED FABRIC WALL COVERINGS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

Section specifies vinyl coated fabric wallcovering and installation.

**1.2 RELATED WORK**

- A. Color, pattern, type, direction of hanging and areas to receive wallcovering: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Textile wallcoverings: Section 09 72 31, POLYPROPYLENE FABRIC WALLCOVERING.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Each type and pattern as specified in Section 09 06 00, SCHEDULE FOR FINISHES.
  - 2. Size: Full width of mill run.
- C. Manufacturer's Certificates:
  - 1. Compliance with CFFA W-101D.
  - 2. Wallcovering manufacturer's approval of adhesive.
- D. Manufacturer's Literature and Data:
  - 1. Primer and adhesive.
  - 2. Installation instructions.
  - 3. Maintenance instructions, including recommended materials and methods for maintaining wallcovering with precautions in use of cleaning material.

**1.4 QUALITY ASSURANCE**

- A. Finish one complete space with each type (color and pattern) of wallcovering showing specified colors and patterns.
- B. Use approved sample spaces as a standard for work throughout the project.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver in original unopened containers bearing the manufacturer's name, brand name, and product designation.
- B. Store in accordance with manufacturer's instructions.
- C. Handle to prevent damage to material.

## **1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Chemical Fabrics and Film Association, Inc., (CFFA):  
2575-96(R2011).....Vinyl Coated Fabric Wallcovering
- C. American Society for Testing and Materials (ASTM)  
G21-09.....Determining Resistance of Synthetic Polymeric  
Materials to Fungi

## **PART 2 - PRODUCTS**

### **2.1 VINYL COATED FABRIC WALLCOVERING**

- A. Comply with CFFA-2575.
- B. Fungi Resistance: ASTM G21, rating of 0.
- C. Factory-applied clear delustered polyvinyl-fluoride (PVF) coating:
  - 1. Minimum 0.0125 mm (1/2 mil) thickness.
  - 2. Do not include PVF coating weight in minimum total weight.
  - 3. Fire hazard classification with PVF coating: Class A unless specified otherwise.
- D. Type I (Light Duty).
- E. Type II (Medium Duty).
- F. Type III (Heavy Duty).

### **2.2 ADHESIVE**

- A. Use only water-based adhesive having volatile organic compounds not more than 50 g/l.
- B. Vermin and mildew resistant.

### **2.3 EDGE GUARDS OR TRIM**

- A. "J" shape with groove to receive the wallcovering.
- B. Concealed edge feathered, not less than 19 mm (3/4 inch) wide.
- C. Designed for adhesive attachment.
- D. Use anodized extruded aluminum.

## **PART 3 - EXECUTION**

### **3.1 JOB CONDITIONS**

- A. Temperatures:
  - 1. Do not perform work until surfaces and materials have been maintained at minimum of 60 °F. for three days before work begins.
  - 2. Maintain minimum temperatures of 60 °F. until adhesives are dried or cured.
- B. Lighting:



1. Do not proceed unless a minimum lighting level of 15 candlepower per square foot occurs.

2. Measure light level at mid-height of wall.

C. Ventilation:

1. Provide uniform continuous ventilation in space.
2. Ventilate for a time for not less than complete drying or curing of adhesive.

D. Protect other surfaces from damage which may be caused by this work.

E. Remove waste from building daily.

### **3.2 SURFACE CONDITION**

A. Inspect surfaces to receive wallcoverings to assure that:

1. Patches and repairs are completed.
2. Surface are clean, smooth and prime painted.

B. Do not proceed until discovered defects have been corrected by other trades and surfaces are ready to receive wallcovering.

C. Carefully remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings, prior to starting work.

D. Carefully store items for reinstallation.

E. Install Edge Guard or Trim:

1. Locate where shown or specified.
2. Run edge guards from top of base to ceiling or wainscot cap in continuous length.
3. Run wainscot cap trim level unless shown otherwise.
4. Install as specified by manufacturer of edge guard or trim, in adhesive.
5. Smooth adhesive edge. Do not leave adhesive exposed to view.
6. Leave ready to receive wallcovering.

### **3.3 APPLICATION OF ADHESIVE**

A. Mix and apply adhesives in accordance with manufacturer's directions.

B. Prevent adhesive from getting on face of wallcovering.

C. Apply adhesive to wallcovering back.

### **3.4 WALLCOVERING INSTALLATION**

A. Use wallcovering of same batch or run in an area. Use fabric rolls in consecutive numerical sequence of manufacture.

B. Install material completely adhered, smooth, clean, without wrinkles, air pockets, gaps or overlaps.

C. Extend wallcovering continuous behind non-built-in casework and other items which are close to but not bolted to or touching the walls.

- D. Install wallcovering before installation of resilient base. Extend wallcovering not more than 6 mm (1/4 inch) below top of resilient base.
- E. Install panels consecutively in order in which they are cut from the roll including filling spaces above or below windows, doors, or similar penetrations.
- F. Do not install horizontal seams.
- G. Except on match patterns, hang fabric by reversing alternate strips, except as recommended by the manufacturer.
- H. Cutting:
  - 1. Cut on a work table with a straight edge.
  - 2. Joints or seams that are not cut clean are unacceptable.
  - 3. Trim additional selvage to achieve a color and pattern match at seams. Overlapped seams are not allowed.
  - 4. Do not double cut seams on wall unless specified.
  - 5. If double cutting on the wall is necessary, place a three inch strip of Type I wallcovering under pasted edge.
    - a. Do not cut into wall surface.
    - b. After cutting, remove strip and excess adhesive from seam before proceeding to next seam.
    - c. Smooth down seam in adhesive for tight bond and joint.
- I. Trim strip-matched patterns, which are not factory pre-trimmed.
- J. Inside Corners:
  - 1. Wrap wallcovering around corner.
  - 2. Do not seam within 50 mm (2 inches) of inside corners.
  - 3. Double cut seam.
- K. Outside Corners:
  - 1. Wrap wallcovering around corner.
  - 2. Do not seam within 150 mm (6 inches) of outside corners.
  - 3. Double cut seam.

### **3.5 PATCHING**

- A. Replace surface damaged wallcovering in a space as specified for new work:
  - 1. Replace full height of surface.
  - 2. Replace from break in plane to break in plane when same batch or run is not used. Double cut seams.
  - 3. Adjoining differential colors from separate batches or runs are not acceptable.
- B. Correct loose or raised seams with adhesives to lay flat with tight bonded joint as specified for new work.

### **3.5 CLEANING AND INSTALLING TEMPORARY REMOVED ITEMS**

- A. Remove adhesive from wallcovering as work proceeds.
- B. Remove adhesives where spilled, splashed or splattered on wallcoverings or adjacent surfaces in a manner not to damage surface from which it is removed.
- C. Reinstall previously removed electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings.

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**SECTION 09 91 00**  
**PAINTING**

**PART 1-GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies field painting.
- B. Section specifies prime coats which may be applied in shop under other sections.
- C. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.

**1.2 RELATED WORK**

- A. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:  
Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- C. Sample Panels:
  - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
  - 2. Panels to show color: Composition board, 100 by 250 by 3 mm (4 inch by 10 inch by 1/8 inch).
  - 3. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 100 by 250 by 3 mm (4 inch by 10 inch face by 1/4 inch) thick minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 by 50 mm (2 by 2 inch) minimum or actual wood member to show complete finish.
  - 4. Attach labels to panel stating the following:
    - a. Federal Specification Number or manufacturers name and product number of paints used.

- b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- c. Product type and color.
- d. Name of project.
- 5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- D. Sample of identity markers if used.
- E. Manufacturers' Certificates indicating compliance with specified requirements:
  - 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
  - 2. High temperature aluminum paint.
  - 3. Epoxy coating.
  - 4. Intumescent clear coating or fire retardant paint.
  - 5. Plastic floor coating.
- F. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.2: For Paints and coatings, documentation including printed statement of VOC content.

#### **1.4 DELIVERY AND STORAGE**

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
  - 1. Name of manufacturer.
  - 2. Product type.
  - 3. Batch number.
  - 4. Instructions for use.
  - 5. Safety precautions.
- B. In addition to manufacturer's label, provide a label legibly printed as following:
  - 1. Federal Specification Number, where applicable, and name of material.
  - 2. Surface upon which material is to be applied.
  - 3. If paint or other coating, state coat types; prime, body or finish.
- C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

#### **1.5 MOCK-UP PANEL**

- A. Before starting application of paint mixtures, apply paint as specified to an area, not to exceed 9 m<sup>2</sup> (100 ft<sup>2</sup>), selected by Resident Engineer.

- B. Finish and texture approved by Resident Engineer will be used as a standard of quality for remainder of work.

#### 1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):  
ACGIH TLV-BKLT-2008.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)  
ACGIH TLV-DOC-2008.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. American National Standards Institute (ANSI):  
A13.1-07.....Scheme for the Identification of Piping Systems
- D. American Society for Testing and Materials (ASTM):  
D260-86.....Boiled Linseed Oil
- E. Commercial Item Description (CID):  
A-A-1555.....Water Paint, Powder (Cementitious, White and Colors) (WPC) (cancelled)  
A-A-3120.....Paint, For Swimming Pools (RF) (cancelled)
- F. Federal Specifications (Fed Spec):  
TT-P-1411A.....Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete and Masonry Walls) (CEP)
- G. Master Painters Institute (MPI):  
No. 1-07.....Aluminum Paint (AP)  
No. 4-07.....Interior/ Exterior Latex Block Filler  
No. 5-07.....Exterior Alkyd Wood Primer  
No. 7-07.....Exterior Oil Wood Primer  
No. 8-07.....Exterior Alkyd, Flat MPI Gloss Level 1 (EO)  
No. 9-07.....Exterior Alkyd Enamel MPI Gloss Level 6 (EO)  
No. 10-07.....Exterior Latex, Flat (AE)  
No. 11-07.....Exterior Latex, Semi-Gloss (AE)  
No. 18-07.....Organic Zinc Rich Primer  
No. 22-07.....Aluminum Paint, High Heat (up to 590° - 1100°F) (HR)  
No. 26-07.....Cementitious Galvanized Metal Primer  
No. 27-07.....Exterior / Interior Alkyd Floor Enamel, Gloss (FE)  
No. 31-07.....Polyurethane, Moisture Cured, Clear Gloss (PV)  
No. 36-07.....Knot Sealer  
No. 43-07.....Interior Satin Latex, MPI Gloss Level 4

- No. 44-07.....Interior Low Sheen Latex, MPI Gloss Level 2
- No. 45-07.....Interior Primer Sealer
- No. 46-07.....Interior Enamel Undercoat
- No. 47-07.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5 (AK)
- No. 48-07.....Interior Alkyd, Gloss, MPI Gloss Level 6 (AK)
- No. 49-07.....Interior Alkyd, Flat, MPI Gloss Level 1 (AK)
- No. 50-07.....Interior Latex Primer Sealer
- No. 51-07.....Interior Alkyd, Eggshell, MPI Gloss Level 3
- No. 52-07.....Interior Latex, MPI Gloss Level 3 (LE)
- No. 53-07.....Interior Latex, Flat, MPI Gloss Level 1 (LE)
- No. 54-07.....Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)
- No. 59-07.....Interior/Exterior Alkyd Porch & Floor Enamel, Low  
Gloss (FE)
- No. 60-07.....Interior/Exterior Latex Porch & Floor Paint, Low  
Gloss
- No. 66-07.....Interior Alkyd Fire Retardant, Clear Top-Coat (ULC  
Approved) (FC)
- No. 67-07.....Interior Latex Fire Retardant, Top-Coat (ULC  
Approved) (FR)
- No. 68-07.....Interior/ Exterior Latex Porch & Floor Paint,  
Gloss
- No. 71-07.....Polyurethane, Moisture Cured, Clear, Flat (PV)
- No. 74-07.....Interior Alkyd Varnish, Semi-Gloss
- No. 77-07.....Epoxy Cold Cured, Gloss (EC)
- No. 79-07.....Marine Alkyd Metal Primer
- No. 90-07.....Interior Wood Stain, Semi-Transparent (WS)
- No. 91-07.....Wood Filler Paste
- No. 94-07.....Exterior Alkyd, Semi-Gloss (EO)
- No. 95-07.....Fast Drying Metal Primer
- No. 98-07.....High Build Epoxy Coating
- No. 101-07.....Epoxy Anti-Corrosive Metal Primer
- No. 108-07.....High Build Epoxy Coating, Low Gloss (EC)
- No. 114-07.....Interior Latex, Gloss (LE) and (LG)
- No. 119-07.....Exterior Latex, High Gloss (acrylic) (AE)
- No. 135-07.....Non-Cementitious Galvanized Primer
- No. 138-07.....Interior High Performance Latex, MPI Gloss Level 2  
(LF)
- No. 139-07.....Interior High Performance Latex, MPI Gloss Level 3  
(LL)
- No. 140-07.....Interior High Performance Latex, MPI Gloss Level 4



No. 141-07.....Interior High Performance Latex (SG) MPI Gloss  
Level 5

H. Steel Structures Painting Council (SSPC):

SSPC SP 1-04 (R2004)....Solvent Cleaning

SSPC SP 2-04 (R2004)....Hand Tool Cleaning

SSPC SP 3-04 (R2004)....Power Tool Cleaning

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Wood Sealer: MPI 31 (gloss) or MPI 71 (flat) thinned with thinner recommended by manufacturer at rate of about one part of thinner to four parts of varnish.

B. Plastic Tape:

1. Pigmented vinyl plastic film in colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES or specified.

2. Pressure sensitive adhesive back.

3. Widths as shown.

C. Identity markers options:

1. Pressure sensitive vinyl markers.

2. Snap-on coil plastic markers.

D. Exterior Oil Wood Primer: MPI 7.

E. Exterior Alkyd Enamel (EO): MPI 9.

F. High Heat Resistant Coating (HR): MPI 22.

G. Knot Sealer: MPI 36.

H. Interior Primer Sealer: MPI 45.

I. Interior Enamel Undercoat: MPI 46.

J. Interior Alkyd, Semi-Gloss (AK): MPI 47.

K. Interior Latex Primer Sealer: MPI 50.

L. Interior Latex, MPI Gloss Level 3 (LE): MPI 52.

M. Interior Latex, Flat, MPI Gloss Level 1 (LE): MPI 53.

N. Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE): MPI 54.

O. Interior / Exterior Alkyd Porch & Floor Enamel, Low Gloss (FE): MPI 59.

P. Interior/ Exterior Latex Porch & Floor Paint, Low Gloss: MPI 60.

Q. Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR): MPI 67.

R. Polyurethane Varnish, Moisture Cured, Clear Flat (PU) MPI 71.

S. Epoxy Cold Cured, Gloss (EC): MPI 77.

T. Interior Wood Stain, Semi-Transparent (WS): MPI 90.

U. Wood Filler Paste: MPI 91.

V. Exterior Alkyd, Semi-Gloss (EO): MPI 94.

W. Fast Drying Metal Primer: MPI 95.

X. High Build Epoxy Coating: MPI 98.

- Y. Epoxy Anti-Corrosive Metal Primer: MPI 101.
- Z. High Build Epoxy Marine Coating (EC): MPI 108.
- AA. Waterborne Galvanized Primer: MPI 134.
- BB. Non-Cementitious Galvanized Primer: MPI 135.
- CC. Interior High Performance Latex, MPI Gloss Level 2(LF): MPI 138.

## **2.2 PAINT PROPERTIES**

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

## **2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE**

- A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
  - 1. Lead-Base Paint:
    - a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
    - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
  - 2. Asbestos: Materials shall not contain asbestos.
  - 3. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
  - 4. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
  - 5. Use high performance acrylic paints in place of alkyd paints, where possible.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24. Verify VOC content of materials specified by MPI Index number. Do not apply products exceeding the following VOC levels, or products not meeting the testing requirement in paragraph B bellow.
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 150 g/L.

3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

### **PART 3 - EXECUTION**

#### **3.1 JOB CONDITIONS**

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
  1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
  2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each days work.
- B. Atmospheric and Surface Conditions:
  1. Do not apply coating when air or substrate conditions are:
    - a. Less than 3 degrees C (5 degrees F) above dew point.
    - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
  2. Maintain interior temperatures until paint dries hard.
  3. Do no exterior painting when it is windy and dusty.
  4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
  5. Apply only on clean, dry and frost free surfaces except as follows:
    - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
    - b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.
  6. Varnishing:
    - a. Apply in clean areas and in still air.
    - b. Before varnishing vacuum and dust area.
    - c. Immediately before varnishing wipe down surfaces with a tack rag.

### 3.2 SURFACE PREPARATION

- A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.
- B. General:
  - 1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
  - 2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
  - 3. See other sections of specifications for specified surface conditions and prime coat.
  - 4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.
- C. Wood:
  - 1. Sand to a smooth even surface and then dust off.
  - 2. Sand surfaces showing raised grain smooth between each coat.
  - 3. Wipe surface with a tack rag prior to applying finish.
  - 4. Surface painted with an opaque finish:
    - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
    - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.
  - 5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
  - 6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
  - 7. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
    - a. Thin filler in accordance with manufacturer's instructions for application.
    - b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.

D. Ferrous Metals:

1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.
3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
  - a. This includes flat head countersunk screws used for permanent anchors.
  - b. Do not fill screws of item intended for removal such as glazing beads.
4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

E. Zinc-Coated (Galvanized) Metal, Aluminum, Copper and Copper Alloys  
Surfaces Specified Painted:

1. Clean surfaces to remove grease, oil and other deterrents to paint adhesion in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Spot coat abraded and damaged areas of zinc-coating which expose base metal on hot-dip zinc-coated items with MPI 18 (Organic Zinc Rich Coating). Prime or spot prime with MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer) depending on finish coat compatibility.

F. Gypsum Plaster and Gypsum Board:

1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A [Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm

(1-inch) in diameter as specified in Section for plaster or gypsum board.

### 3.3 PAINT PREPARATION

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

### 3.4 APPLICATION

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
- E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
- F. Apply by brush, roller or spray, except as otherwise specified.
  - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
  - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.
- G. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

### 3.5 PRIME PAINTING

- A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- E. Wood and Wood Particleboard:
  - 1. Use same kind of primer specified for exposed face surface.
    - b. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
    - c. Transparent finishes as specified under Transparent Finishes on Wood except Floors.
  - 2. Apply two coats of primer sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) to surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reason.
  - 3. Apply one coat of primer MPI 7 sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
  - 4. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.
  - 5. Apply MPI 67 (Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR) to wood for fire retardant finish.
- F. Metals except boilers, incinerator stacks, and engine exhaust pipes:
  - 1. Steel and iron: MPI 95 (Fast Drying Metal Primer).
  - 2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer).
  - 3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
  - 5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
  - 6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel (EO)).
  - 8. Metal over 94 degrees C. (200 degrees F), Boilers, Incinerator Stacks, and Engine Exhaust Pipes: MPI 22 (High Heat Resistant Coating (HR)).

G. Gypsum Board and Hardboard:

2. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) MPI 46 (Interior Enamel Undercoat) in shower and bathrooms.
3. Surfaces scheduled to receive vinyl coated fabric wallcovering: Use MPI 45 (Interior Primer Sealer).
4. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 77 (Epoxy Cold Cured, Gloss (EC)).

**3.6 EXTERIOR FINISHES**

- A. Apply following finish coats where specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Steel and Ferrous Metal:
  1. Two coats of MPI 94 (Exterior Alkyd, Semi-Gloss (EO)) on exposed surfaces, except on surfaces over 94 degrees C (200 degrees F).
- C. Machinery without factory finish except for primer: One coat MPI 94 (Exterior Alkyd, Semi-Gloss (EO)).

**3.7 INTERIOR FINISHES**

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Metal Work:
  1. Apply to exposed surfaces.
  2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
  3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
    - a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) unless specified otherwise.
    - e. Machinery: Two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)).
    - f. Asphalt Coated Metal: One coat MPI 1 (Aluminum Paint (AP)).
    - g. Ferrous Metal over 94 degrees K (200 degrees F): Boilers, Incinerator Stacks, and Engine Exhaust Pipes: One coat MPI 22 (High Heat Resistant Coating (HR)).
- C. Gypsum Board:
  2. Two coats of MPI 138 (Interior High Performance Latex, MPI Gloss Level 2 (LF)).
- D. Wood:
  1. Sanding:
    - a. Use 220-grit sandpaper.
    - b. Sand sealers and varnish between coats.



- c. Sand enough to scarify surface to assure good adhesion of subsequent coats, to level roughly applied sealer and varnish, and to knock off "whiskers" of any raised grain as well as dust particles.
- 2. Sealers:
  - a. Apply sealers specified except sealer may be omitted where pigmented, penetrating, or wiping stains containing resins are used.
  - b. Allow manufacturer's recommended drying time before sanding, but not less than 24 hours or 36 hours in damp or muggy weather.
  - c. Sand as specified.
- 3. Paint Finish:
  - a. One coat of MPI 46 (Interior Enamel Undercoat) plus one coat of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) (SG).
- 4. Transparent Finishes on Wood Except Floors.
  - a. Natural Finish:
    - 1) One coat of sealer as written in 2.1 E.
    - 2) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV)).
  - b. Stain Finish:
    - 1) One coat of MPI 90 (Interior Wood Stain, Semi-Transparent (WS)).
    - 2) Use wood stain of type and color required to achieve finish specified. Do not use varnish type stains.
    - 3) One coat of sealer as written in 2.1 E.
    - 4) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV)).
  - c. Varnish Finish:
    - 1) One coat of sealer as written in 2.1 E.
    - 2) Two coats of MPI 71 (Polyurethane, Moisture Cured, Clear Flat (PV)).
- E. Miscellaneous:
  - 1. Apply where specified in Section 09 06 00, SCHEDULE FOR FINISHES.

### **3.8 REFINISHING EXISTING PAINTED SURFACES**

- A. Clean, patch and repair existing surfaces as specified under surface preparation.
- B. Remove and reinstall items as specified under surface preparation.
- C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.

- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- G. Coat knots and pitch streaks showing through old finish with MPI 36 (Knot Sealer) before refinishing.
- H. Sand or dull glossy surfaces prior to painting.
- I. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

### **3.9 PAINT COLOR**

- A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.
- C. Coat Colors:
  - 1. Color of priming coat: Lighter than body coat.
  - 2. Color of body coat: Lighter than finish coat.
  - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
  - 1. Paint to match color of casework where casework has a paint finish.
  - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

### **3.10 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE**

- A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.
- B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified under paragraph H, colors.
- C. Paint various systems specified in Division 02 - EXISTING CONDITIONS, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY.
- D. Paint after tests have been completed.
- E. Omit prime coat from factory prime-coated items.
- F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in

concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.

G. Omit field painting of items specified in paragraph, Building and Structural WORK NOT PAINTED.

H. Color:

1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.

2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:

- a. White .....Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
- b. Gray: .....Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
- c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).
- d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conduits containing fire alarm control wiring, and fire alarm equipment.
- e. Federal Safety Orange: .Entire lengths of electrical conduits containing feeders 600 volts or more.
- f. Color to match brickwork sheet metal covering on breeching outside of exterior wall of boiler house.

I. Apply paint systems on properly prepared and primed surface as follows:

1. Exterior Locations:

- a. Apply two coats of MPI 94 (Exterior Alkyd, Semi-gloss (EO)) to the following ferrous metal items:  
Vent and exhaust pipes with temperatures under 94 degrees C (200 degrees F), roof drains, fire hydrants, post indicators, yard hydrants, exposed piping and similar items.
- b. Apply two coats of MPI 11 (Exterior Latex, Semi Gloss (AE)) to the following metal items:  
Galvanized and zinc-copper alloy metal.

- c. Apply one coat of MPI 22 (High Heat Resistant Coating (HR)), 650 degrees C (1200 degrees F) to incinerator stacks, boiler stacks, and engine generator exhaust.
- 2. Interior Locations:
  - a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) to following items:
    - 1) Metal under 94 degrees C (200 degrees F) of items such as bare piping, fittings, hangers and supports.
    - 2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, cast-iron radiators, electric conduits and panel boards.
    - 3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.
  - b. Apply one coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)) on finish of insulation on boiler breeching and uptakes inside boiler house, drums, drumheads, oil heaters, feed water heaters, tanks and piping.
  - c. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 94 degrees K (200 degrees F) of following items:
    - 1) Garbage and trash incinerator.
    - 2) Medical waste incinerator.
    - 3) Exterior of boilers and ferrous metal in connection with boiler settings including supporting members, doors and door frames and fuel oil burning equipment.
    - 4) Steam line flanges, bare pipe, fittings, valves, hangers and supports over 94 degrees K (200 degrees F).
    - 5) Engine generator exhaust piping and muffler.
  - d. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 94 (Exterior Alkyd, Semi-gloss (EO)) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.
- 3. Other exposed locations:
  - a. Metal surfaces, except aluminum, of cooling towers exposed to view, including connected pipes, rails, and ladders: Two coats of MPI 1 (Aluminum Paint (AP)).
  - b. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)).

### 3.11 BUILDING AND STRUCTURAL WORK FIELD PAINTING

- A. Painting and finishing of interior and exterior work except as specified under paragraph 3.11 B.
  - 1. Painting and finishing of new work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.
  - 2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
  - 3. Painting of ferrous metal and galvanized metal.
  - 4. Identity painting and safety painting.
- B. Building and Structural Work not Painted:
  - 1. Prefinished items:
    - a. Casework, doors, elevator entrances and cabs, metal panels, wall covering, and similar items specified factory finished under other sections.
    - b. Factory finished equipment and pre-engineered metal building components such as metal roof and wall panels.
  - 2. Finished surfaces:
    - a. Hardware except ferrous metal.
    - b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
    - c. Signs, fixtures, and other similar items integrally finished.
  - 3. Concealed surfaces:
    - a. Inside dumbwaiter, elevator and duct shafts, interstitial spaces, pipe basements, crawl spaces, pipe tunnels, above ceilings, attics, except as otherwise specified.
    - b. Inside walls or other spaces behind access doors or panels.
    - c. Surfaces concealed behind permanently installed casework and equipment.
  - 4. Moving and operating parts:
    - a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
    - b. Tracks for overhead or coiling doors, shutters, and grilles.
  - 5. Labels:
    - a. Code required label, such as Underwriters Laboratories Inc., Inchcape Testing Services, Inc., or Factory Mutual Research Corporation.
    - b. Identification plates, instruction plates, performance rating, and nomenclature.
  - 6. Galvanized metal:

- a. Exterior chain link fence and gates, corrugated metal areaways, and gratings.
- b. Gas Storage Racks.
- c. Except where specifically specified to be painted.
7. Metal safety treads and nosings.
8. Gaskets.
9. Concrete curbs, gutters, pavements, retaining walls, exterior exposed foundations walls and interior walls in pipe basements.
10. Face brick.
11. Structural steel encased in concrete, masonry, or other enclosure.
12. Structural steel to receive sprayed-on fire proofing.
13. Ceilings, walls, columns in interstitial spaces.
14. Ceilings, walls, and columns in pipe basements.
15. Wood Shingles.

### 3.12 IDENTITY PAINTING SCHEDULE

- A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.
  1. Legend may be identified using 2.1 G options or by stencil applications.
  2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12 000 mm (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
  3. Locate Legends clearly visible from operating position.
  4. Use arrow to indicate direction of flow.
  5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on drawings where asterisk appears for High, Medium, and Low Pressure designations as follows:
    - a. High Pressure - 414 kPa (60 psig) and above.
    - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
    - c. Low Pressure - 103 kPa (14 psig) and below.
    - d. Add Fuel oil grade numbers.
  6. Legend name in full or in abbreviated form as follows:

	COLOR OF	COLOR OF	COLOR OF	LEGEND
PIPING	EXPOSED PIPING	BACKGROUND	LETTERS	BBREVIATIONS

Blow-off		Yellow	Black	Blow-off
Boiler Feedwater		Yellow	Black	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
Hot Water Heating Supply		Yellow	Black	H. W. Htg Sup
Hot Water Heating Return		Yellow	Black	H. W. Htg Ret
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Vacuum Condensate Return		Yellow	Black	Vac Cond Ret
Boiler Water Sampling		Yellow	Black	Sample
Chemical Feed		Yellow	Black	Chem Feed
Continuous Blow-Down		Yellow	Black	Cont. B D
Pumped Condensate		Black		Pump Cond
Pump Recirculating		Yellow	Black	Pump-Recirc.
Vent Line		Yellow	Black	Vent
Alkali		Yellow	Black	Alk
Bleach		Yellow	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain

Pump Drainage	Green	White	Pump Disch
Chemical Resistant Pipe			
Waste	Yellow	Black	Acid Waste
Vent	Yellow	Black	Acid Vent
Atmospheric Vent	Green	White	ATV
Silver Recovery	Green	White	Silver Rec
Fuel Gas	Yellow	Black	Gas
Fire Protection Water			
Sprinkler	Red	White	Auto Spr
Standpipe	Red	White	Stand
Sprinkler	Red	White	Drain

7. See Sections for methods of identification, legends, and abbreviations of the following:

- a. Regular compressed air lines: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
- c. Laboratory gas and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- e. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.
3. Locate not more than 6100 mm (20 feet) on center on corridor sides of partitions, and with a least one message per room on room side of partition.
4. Use semigloss paint of color that contrasts with color of substrate.

**3.14 PROTECTION CLEAN UP, AND TOUCH-UP**

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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**SECTION 13 05 41**  
**SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Provide seismic restraint in accordance with the requirements of this section in order to maintain the integrity of nonstructural components of the building so that they remain safe and functional in case of seismic event.
- B. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:
  - 1. Architectural Elements: Facades that are not part of the structural system and its shear resistant elements; cornices and other architectural projections and parapets that do not function structurally; glazing; nonbearing partitions; suspended ceilings; stairs isolated from the basic structure; cabinets; bookshelves; medical equipment; and storage racks.
  - 2. Electrical Elements: Power and lighting systems; substations; switchgear and switchboards; auxiliary engine-generator sets; transfer switches; motor control centers; motor generators; selector and controller panels; fire protection and alarm systems; special life support systems; and telephone and communication systems.
  - 3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems; boiler equipment and components.
  - 4. Transportation Elements: Mechanical, electrical and structural elements for transport systems, i.e., elevators and dumbwaiters, including hoisting equipment and counterweights.

**1.2 RELATED WORK:**

- A. Section No. 14 26 26.1 ELECTRIC TRACTION ELEVATORS P-1 THROUGH P-6.
- B. Section No. 14 26 26.2 ELECTRIC TRACTION ELEVATORS S-1 THROUGH S-4.
- C. Division 26 Electrical Sections.

**1.3 QUALITY CONTROL:**

- A. Shop-Drawing Preparation:
  - 1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the state of California.

2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State of California.

B. Coordination:

1. Do not install seismic restraints until seismic restraint submittals are approved by the Resident Engineer.
2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.

C. Seismic Certification:

In structures assigned to IBC Seismic Design Category C, D, E, or F, permanent equipments and components are to have Special Seismic Certification in accordance with requirements of section 13.2.2 of ASCE 7 except for equipment that are considered rugged as listed in section 2.2 OSHPD code application notice CAN No. 2-1708A.5, and shall comply with section 13.2.6 of ASCE 7.

**1.4 SUBMITTALS:**

A. Submit a coordinated set of equipment anchorage drawings prior to installation including:

1. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
2. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, welds etc. clearly identified and specified.
3. Numerical value of design seismic brace loads.
4. For expansion bolts, include design load and capacity if different from those specified.

B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:

1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
3. Pipe contents.
4. Structural framing.
5. Location of all gravity load pipe supports and spacing requirements.
6. Numerical value of gravity load reactions.
7. Location of all seismic bracing.
8. Numerical value of applied seismic brace loads.

- ### 1.5 APPLICABLE PUBLICATIONS:

- 13 05 41 - 3

- A325M-09.....Standard Specification for High-Strength Bolts  
for Structural Steel Joints [Metric]
- A490-10.....Standard Specification for Heat-Treated Steel  
Structural Bolts, 150 ksi Minimum Tensile  
Strength
- A490M-10.....Standard Specification for High-Strength Steel  
Bolts, Classes 10.9 and 10.9.3, for Structural  
Steel Joints [Metric]
- A500/A500M-10.....Standard Specification for Cold-Formed Welded  
and Seamless Carbon Steel Structural Tubing in  
Rounds and Shapes
- A501-07.....Specification for Hot-Formed Welded and Seamless  
Carbon Steel Structural Tubing
- A615/A615M-09.....Standard Specification for Deformed and Plain  
Billet-Steel Bars for Concrete Reinforcement
- A992/A992M-06.....Standard Specification for Steel for Structural  
Shapes for Use in Building Framing
- A996/A996M-09.....Standard Specification for Rail-Steel and Axel-  
Steel Deformed Bars for Concrete Reinforcement
- E488-96(R2003).....Standard Test Method for Strength of Anchors in  
Concrete and Masonry Element
- E. American Society of Civil Engineers (ASCE 7) Latest Edition.
- F. International Building Code (IBC) Latest Edition
- G. VA Seismic Design Requirements, H-18-8, February 2011
- H. National Uniform Seismic Installation Guidelines (NUSIG)
- I. Sheet Metal and Air Conditioning Contractors National Association  
(SMACNA): Seismic Restraint Manual - Guidelines for Mechanical Systems,  
1998 Edition and Addendum

#### **1.6 REGULATORY REQUIREMENT:**

- A. IBC 2009.
- B. Exceptions: The seismic restraint of the following items may be omitted:
  - 1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
  - 2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
  - 3. Gas and medical piping less than 2 ½ inches inside diameter.
  - 4. Piping in boiler plants and equipment rooms less than 1 ¼ inches inside diameter.
  - 5. All other piping less than 2 ½ inches inside diameter, except for automatic fire suppression systems.

6. All piping suspended by individual hangers, 12 inches or less in length from the top of pipe to the bottom of the support for the hanger.
7. All electrical conduits, less than 2 ½ inches inside diameter.
8. All rectangular air handling ducts less than six square feet in cross sectional area.
9. All round air handling ducts less than 28 inches in diameter.
10. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

## **PART 2 - PRODUCTS**

### **2.1 STEEL:**

- A. Structural Steel: ASTM A36.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Structural Tubing: ASTM A501.
- D. Steel Pipe: ASTM A53/A53M, Grade B.
- E. Bolts & Nuts: ASTM A307.

## **PART 3 - EXECUTION**

### **3.1 CONSTRUCTION, GENERAL:**

- A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.
- B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.
- C. Construct seismic restraints and anchorage to allow for thermal expansion.
- D. Testing Before Final Inspection:
  1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.
  2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

### **3.3 MECHANICAL DUCTWORK AND PIPING; BOILER PLANT STACKS AND BREACHING; ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS; AND TELECOMMUNICATION WIRES AND CABLE TRAYS**

- A. Support and brace mechanical ductwork and piping; electrical busways, conduits and cable trays; and telecommunication wires and cable trays including boiler plant stacks and breeching to resist directional forces (lateral, longitudinal and vertical).

- B. Brace duct and breeching branches with a minimum of 1 brace per branch.
- C. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment, or building members.
- D. Seismic Restraint of Piping:
  - 1. Design criteria:
    - a. Piping resiliently supported: Restrain to support 120-percent of the weight of the systems and components and contents.
    - b. Piping not resiliently supported: Restrain to support 60-percent of the weight of the system components and contents.
- E. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative differential movements between the pipe and equipment under conditions of earthquake shaking.

#### **3.4 RACKS AND CABINETS**

- A. Install racks to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.
- C. Anchor cabinets to the floor or walls, and equip all drawers with properly engaged, lockable latches.

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ELEVATOR RETROFIT BLDG 500  
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**SECTION 14 26 26**  
**ELEVATORS P-1 THROUGH P-6**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section of the specification is intended to cover the complete furnishing of all labor, materials, engineering and components on elevators located in Building 500. The elevators included in the specification are existing elevators P-1, P-2, P-3, P-4, P-5, P-6 (one group).

**1.2 SCOPE OF WORK**

- A. All elevators; Replace existing overhead DC gearless traction machines with overhead AC gearless machines, secondary sheaves, car top and counterweight sheaves, hoist cables, governors, hoistway doors and door equipment and compensation cables and sheaves. Reuse existing machine beams, main and counterweight rails, buffers, counterweights, entrance frames, sills, hanger supports, strut angles, fascia plates, platforms, and cabs.
- B. A site visit required for all bidders.

**1.3 ELEVATOR SERVICE**

- A. Two elevators may be removed from service at any one time, from this group, unless prior arrangement is made with Contracting Officer and/or Contracting Officer's Representative (COR) to permit performance of work. All work on elevator vacated shall be completed, put into operation, and temporarily accepted before work on any other elevator can start. Prior to each temporary acceptance, contractors shall complete all pertinent safety tests and inspections. Final inspection and tests shall be given only when all work on all elevators has been completed. Final acceptance shall be given only upon successful completion of final inspection and tests. Premises shall be occupied during performance of work, but Contractor shall have uninterrupted use of scheduled elevator vacated for completion of work.
- B. When more than one elevator must be removed from service for cross connection of hall pushbuttons or interface of dispatching controls, contractor shall perform this work after 7:00 PM and before 6:30 AM. The Contracting Officer and/or Contracting Officer's Representative (COR) shall be notified fourteen (14) calendar days in advance of this work.

**1.4 WORK SCHEDULE**

- A. Before work is started, submit prepared work schedule for approval and arrange with COR sequence of procedure, means of access to premises, space for storage, use of approaches, corridors, stairways and elevators, location of temporary partitions, etc. The COR must be notified fourteen (14) calendar days, in writing, in advance of starting work on elevator. No work may begin on any elevator until all materials for that elevator has been delivered to the site and verified by the Contracting Officer and/or Contracting Officer's Representative. The VA does not accept deliveries of equipment. The phasing of work on the elevators shall be coordinated with the Contracting Officer and/or the Contracting Officer's Representative.

**1.5 SAFETY PRECAUTIONS**

- A. Building will be occupied during execution of work. Work shall be conducted in a manner to afford maximum protection of building, facilities, patients, employees and the public and to prevent unreasonable delay or interference with normal functioning of hospital activities.
- B. Where adjacent car is in operation, isolate elevators from each other by suitable barriers (removable screen) between them, extending from pit floor to bottom of secondary slab at top of hoistway, while work is in progress. Remove partition when work is completed.

- C. Provide fire extinguishers so that they shall be readily available at all times at work site.
- D. It shall be the obligation of the Contractor to maintain a free and clear passageway in each elevator lobby. Parts, tools, etc. shall be kept within the confines of entrance partitions. Trash and debris shall be removed daily.

#### 1.6 REMOVED MATERIALS AND EQUIPMENT

- A. Materials that are required to be removed and not specified to be reused or retained under contract shall be removed weekly from the site at the expense of the Contractor. Contractor shall receive title to all materials and equipment required to be removed and not specified to be reused or retained, as of date of withdrawal of material from service by Contractor to complete required and scheduled work. Government does not warrant condition of said material to which Contractor shall obtain title, nor shall Government be liable for damage before or after title passes to Contractor.

#### 1.7 APPLICABLE PUBLICATIONS

- A. The following specifications and standards of the issues listed below (including the amendments, addenda, and errata designated) form a part of this specification to the extent indicated by the reference thereto. In text, such specifications and standards are referred to by basic number or designation only.
- B. Federal Specifications (Fed. Spec.):
  - J-C-30B(1).....Cable and Wire: Electrical (Power, Fixed Installation).
  - W-C-596A(2).....Connector, Plug, Electrical; Connector, Receptacle, Electrical.
  - W-F-406E.....Fittings for Cable, Power, Electrical & Conduit, Metal, Flexible.
  - W-F-408E.....Fittings for Conduit, Metal, Rigid, (Thick-Wall & Thin Wall (EMT) Type).
  - ABSI/UL 797.....Conduit, Metal, Rigid: Electrical, Thin-wall Steel Type (Electrical Metallic Tubing): Straight Lengths, Elbows & Bends.
  - WW-C-566C.....Conduit, Metal, Rigid: and Coupling, Elbow, and Nipple, Electrical Conduit: Zinc-coated.
- 1. GAUGES: Sheet and Plate: U.S. Standard Wire: American wire Gauge (AWG).
- 2. D1.1-72: American Welding Society (AWS).
- 3. IEEE: Institute of Electrical and Electronic Engineers.
- 4. NEMA: National Electric Manufacturers Association.
- 5. NFPA No. 252: Fire Tests of Door Assemblies.
- C. The following standards and codes of the issues listed below (including the latest amendments, addenda, and errata) form a part of this specification:
  - 1. A17.1: 2010 American National Standards Institute (ANSI/ASME) Standards: Safety Code for Elevators and Escalators. In text, publication will be referred to as the Code.
  - 2. A17.2: 2010 American National Standards Institute (ANSI) Standards: Practice for the Inspection of Elevators, Escalators and Moving Walks, Inspector's Manual.

3. NFPA No. 70: (Latest version) National Electrical Code. In text, the Code will be referred to as NEC.
4. Uniform Federal Accessibility Standards & VA Supplement to uniform Federal Accessibility Standards, 1988.
5. Americans with Disabilities Act, Latest edition with supplements.

#### **1.8 QUALIFICATIONS:**

- A. Approval by the Contracting Officer is required of products or services of proposed manufacturer, suppliers and installers and will be contingent upon submission by Contractor of a certificate stating the following:
  1. Elevator contractor is currently and regularly engaged in modernization of elevator equipment as one of his principal products.
  2. Installer has technical qualifications of at least five years of successful experience, trained supervisory and installation personnel, and facilities to install and/or modernize elevator equipment specified herein.
  3. The installers shall be Certified Elevator Mechanics with qualifications of at least five years of successful experience and Apprentices actively pursuing certified mechanic status. Certificates shall be submitted for all workers in this capacity.
  4. Proposed Contractor shall submit a list of two or more prior hospital installations where all the elevator equipment he proposes to furnish on this project has performed satisfactorily together under conditions of normal use. The list shall include projects that have been in operation for a period of not less than two years proceeding the date of these specifications; include the names and addresses of the Medical Center and the names of the Medical Center Administrators.
- B. Approval of elevator contractor's maintenance/service will be contingent upon being able to render services within two hours of receipt of notification. Elevator contractor shall submit the names and addresses of his authorized branch or service department which will render service to this installation, together with certification that the quantity and quality of replacement parts stock on hand is sufficient to guarantee continued operation of the elevator installation.
- C. Elevator equipment shall operate with maximum noise of 80 decibels. They shall be sufficiently quiet so that they will not create objectionable noises in the car and hoistway, or create a disturbance to occupants on the various floors adjacent to the hoistway and machine room. The COR reserves the right to reject equipment and installations which are, in their opinion, not sufficiently quiet under all operating conditions.

#### **1.9 WIRING DIAGRAMS**

- A. Provide three complete sets of field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway, as well as the machine room. Install one set framed under plastic and mounted in the elevator machine room as directed by the COR. In the event field modifications are found necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the COR within 30 days of final acceptance.
- B. 3 sets of the following information relating to the specific type of microprocessor controls installed on this project shall be provided:
  1. Owner's information manual, containing general data on major components maintenance and adjustment.
  2. System logic description.

3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and/or replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

#### **1.10 ADDITIONAL EQUIPMENT**

- A. Additional equipment required to operate specified equipment manufactured and contemplated for this installation shall be furnished and installed. The cost of such equipment shall be included in the base bid.

#### **1.11 SAMPLES AND DESCRIPTIVE DATA**

- A. Materials shall be submitted singularly and separately and apart from materials specified under other Sections and shall be marked 'SUBMITTED UNDER SECTION 14 26 26". In accordance with provisions of section 01340, SAMPLES AND SHOP DRAWINGS, all submitted drawings and related elevator material shall be forwarded to the VAMC West Los Angeles, Engineering Service (138), P.O. BOX 69004, Los Angeles, CA., 7136-9004, Attention Francisco Silva, in order to perform a concurrent review.
- B. Before executing any work, furnish information sufficient to evidence full compliance with contract requirements on proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, rating) and corresponding specification references (Federal or project specification number and paragraph).
- C. Name of manufacturer, type or style designation and applicable data of the following equipment shall be shown on the elevator submittals:
1. Controllers; VVVF AC
  2. Group Supervisory System Controller
  3. Selector/Leveling unit
  4. VVVF, AC Drive, gearless motors.
  5. Electric door operator; H.P. rating and R.P.M. of motor.
  6. Governors
  7. Infrared door curtain units.
  8. Motion Control (MCI) iView Monitor computer system.
  9. Car top fans.
  10. Counterweight buffers, Elevators P-1, P-2
  11. Compensation chains.
  12. Secondary, car top and counterweight sheaves.
  13. Car top run button.
  14. Audio voice with list of messages.
  15. Auto dial phone system.
- D. Shop Drawings:
1. Cuts or drawings and description of power door operator.
  2. Cuts or drawings showing details of all signal and car equipment fixtures.

3. Furnish certificates as required under paragraph "Qualifications"
4. Car operating panels.
5. Hoistway doors, tracks, hangers and rollers, closers, pick up and release arms and rollers, and interlocks.
6. Car doors.
7. Cabs and cab ceilings.
8. Re-skin hoistway door jamb entrances.
9. Re-skin front return panels and car door header.

#### **1.12 PERFORMANCE STANDARDS**

- A. The elevators shall be capable of meeting the highest standards of the industry and specifically the following.
- B. Contract speed shall mean speed in the UP direction with full capacity load in the car. Speed variation under any load condition, regardless of direction, shall be no more than 5 percent.
- C. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per second and the maximum acceleration and retardation shall not exceed 0.2G per second.
- D. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration and deceleration. Stopping shall be without bumps or jars.
- E. Full speed running shall be quiet and free from vibration and swaying. When cars are standing at the floor with doors open, they shall remain firmly stopped and shall not rock side to side.
- F. Rope stretch recovery shall be provided to re-level cars at a floor, if the ropes slightly stretch.
- G. Cars shall not move from side to side during the process of opening and closing the doors.
- H. Elevator control systems shall be capable of starting the car without noticeable "roll-back" of hoistway machine sheave, regardless of load condition in car, location of car, or direction of travel.

#### **1.13 TOLERANCES**

- A. Floor Accuracy:

1. Leveling control systems, 1/8 inch above or below the floor.

#### **1.14 GUARANTEE:**

- A. The modernized elevator systems shall be guaranteed beginning with the completion and final acceptance of the last elevator installation by the COR. It shall be subject to terms of "GUARANTEE" articles of Section GENERAL CONDITIONS (except for length of guarantee). Upon receipt of notice from the Government of failure of any portion of materials and workmanship furnished, affected part or parts shall be replaced promptly with new parts by and at the expense of the contractor. The guarantee period shall concur with the length of the maintenance contract (1 year).
- B. No device will be acceptable that will not give perfect satisfaction without excessive maintenance and attention. If it becomes evident during the guarantee period that the device is not functioning properly or in accordance with specification requirements, or, if in the opinion of the COTR, excessive maintenance and attention must be employed to keep device operating, device shall be installed as part of work until satisfactory operation of installation is obtained. Period of guarantee shall start anew

from date of completion of new installation performed in accordance with foregoing requirements.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish (150 grit) on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and all surfaces shall be perfectly smooth and without waves. During renovation, all stainless steel surfaces shall be protected by suitable material.

### **2.2 MANUFACTURED PRODUCTS**

- A. Materials, devices and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. Items not meeting this requirement, but which otherwise meet technical specifications and the merits of which can be established through reliable test reports or physical examination of representative samples, will be considered.
- B. When two or more units of same class of materials, devices or equipment are required, these units shall be products of one manufacturer.
- C. Manufactures of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit.
1. All components of an assembled unit shall be products of the same manufacturer.
  2. Parts which are alike shall be the product of a single manufacturer.
  3. Components shall be compatible with each other and with the total assembly for the intended service.
- D. If the elevator equipment to be installed is not known to the COR, the Elevator Contractor shall submit drawings in triplicate for approval, showing all details.
- E. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS D1.1 to perform type of work required. VAMC shall require welding certificates be submitted for all workers employed in this capacity. A welding or burning permit is required and shall be obtained from the VA COR. Request permit one day in advance.
- F. Motor nameplates shall state rated horsepower, speed, volts, amperes and other characteristics required by NEMA Standards and shall be securely attached to the item of equipment in a conspicuous location.
- G. The elevator equipment, including controllers, selectors, door operators, leveling units, and supervisory system, each shall be the product of one manufacturer of established reputation, except that any of the above items may be the products, either wholly or in part, of any manufacturer of established reputation provided such items are capably engineered and produced under coordinated specifications to ensure a first class, safe and smooth operating system.
- H. Where key operating switches are furnished in conjunction with any component of this elevator installation; furnish 4 keys for each individual switch or lock. All new keys to match elevator keys on elevators located in Building 258. Where needed provide blank key cores. VA will provide correct key core with keys. Do not provide "barrel type" keys. Fire service key switch shall be provided to match Building 258. Attach each key to a tag bearing a stamped or etched legend identifying its purpose. Engrave tags and imprint "Property of U.S. Government" on the reverse side.

### 2.3 CAPACITY, SPEED, TRAVEL, ETC.

- A. Each elevator shall have the capacity to lift a live load (exclusive of the weight of the car and ropes) at the speed in feet per minute as specified in the following schedule:

Elev. No	Rated Load Lbs.	Speed FPM	Rated Travel Ft.	Total Floors Served	Stops	No. of Openings
P-1, P-2, P-3, P-4 P-6	4000	500	131' 8"	G,1-6	7	7
P-5	4000	500	148'	G,1-6, PH	8	8

- B. Total travel is approximate and must be verified in the field by the Contractor.
- C. Rated speed shall mean speed in either direction of travel with rated capacity load in car. Actual speed, under any load condition shall not vary more than five percent of rated speed.

### 2.4 POWER SUPPLY

- A. Power for emergency operation of elevators specified will be available from emergency power feeders and transfer switch.
- B. Reuse existing shunt trip circuit breakers located in elevator machine room.
- C. See Paragraph 2.11 Auxiliary power operation.

### 2.5 GROUNDING

- A. Equipment grounding shall be provided. Ground conductors, supports, controller enclosure, motors, platform and car frames and other noncurrent conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, insulated and sized as required by NEC. Bond the grounding wires to each pull boxes, junction boxes, cabinets and other enclosures through which the wires pass.

### 2.6 CONDUIT, WIREWAY (DUCT):

- A. May reuse existing conduit and wireway duct located in hoistway and machine room that conforms to NEC. New conduit and duct shall comply with the following paragraphs.
- B. Unless otherwise specified or approved, install electrical conductors, except traveling cable connections to the car, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Where permitted by NEC, 1/2-inch trade size conduits and EMT may be used only for tap connections to interlocks, emergency exits and leveling units. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. No rigid conduit or electrical metallic tubing shall be smaller than 3/4-inch electrical trade size. An auxiliary gutter may be used between controller, starter, and similar apparatus in the elevator machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 3/8 inch electrical trade size may be used, not exceeding 18 inches in length, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC. Flexible heavy-

duty service cord, type S.O., may be used between fixed car wiring and switches on car doors for infrared curtain units.

- C. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushing. Install a steel lock nut under the bushing if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.
- D. Conduit and EMT fittings and connectors using set screws or indentations as a means of attachment shall not be used.
- E. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits. Certain existing conduits and ducts may be reused if they are code conforming and prior agreement is received from the COR.

## **2.7 CONDUCTORS: PROVIDE NEW**

- A. Unless otherwise specified, conductors, exclusive of traveling cables, shall be stranded or solid coated annealed copper in accordance with Fed. Spec. J-C-30 for either type RHW or THW. Where 16 and 18 AWG are permitted by NEC, either single conductor cable in accordance with Fed. Spec. J-C-580 for type TF or multiconductor cable may be used, provided the insulation of single conductor cable may be, and outer jacket of multiconductor cable is flame retardant and moisture resistant. Multiconductor cable shall have color coding or other suitable identification for each conductor. Conductors for control board wiring, including wiring between main circuit resistors and control boards, shall be in accordance with NEC. No joints or splices will be permitted in wiring, except as outlets. Tap connectors may be used in wireways, provided they meet all UL requirements.
- B. All wiring must test free from short circuits or grounds. Insulation resistance between individual external conductors and between conductors and ground, shall be not less than one megohm.
- C. Where size of conductors is not given, capacity shall be such that maximum current shall not exceed limits prescribed by NEC.
- D. Terminal connections for all conductors used for external wiring between various items of elevator equipment shall be solderless pressure wire connectors in accordance with Fed. Spec. W-S-Glo. The contractor may at his option make these terminal connections on No. 10 or small conductors with approved terminal eyelets set on the conductor with a special setting tool or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.
- E. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits. Certain existing conduits and ducts may be reused if they are code conforming and prior agreement is received from the COR.

## **2.8 TRAVELING CABLES: PROVIDE NEW**

- A. All conductors to the car shall consist of flexible traveling cables conforming with the requirements of NEC. Traveling cables shall run from top of the car directly to controller.
- B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than four spare conductors in each traveling cable.
- C. Provide shielded coaxial conductors for the auto dial system within the traveling cable. Add 5 pair shielded wires for possible future card reader, 2RG/6U coaxial CCTV cables and 2 pair 14 gauge wire for CCTV power as needed.



- D. If, due to sway or change in relative position of traveling cables, complete freedom from contact with the hoistway or elevator construction cannot be obtained, shields or pads shall be provided on the elevator of hoistway structure wherever necessary to prevent damage to the traveling cables.
- E. Car lighting circuits shall be connected to the auxiliary/emergency power panel.

**2.9 CONTROLLERS, STARTERS, RELAY PANELS, SUPERVISORY PANELS AND SELECTORS:  
EXISTING TO BE REMOVED**

- A. All controllers required for the control, dispatching, signals and door operations of the system shall be in accordance with the requirements of this paragraph.
- B. All controller assemblies shall provide efficient, smooth and practically stepless acceleration and deceleration of the elevator hoisting machine, automatically and independently of the load in the car. The panel material shall be self-extinguishing, having a flame resistance that meet the requirements of either flammability test method 2021 or 2023, or Federal Test Method Standard No. 406.
- C. All switches, relays and other components shall be mounted on the front of controller, starter, relay and selector panels. All wiring connections for controller components, resistors in excess of 30-watt capacity and transformers shall be mounted within enclosure. All controller wiring shall be neatly formed, laced and securely fastened in place.
- D. If swing panel construction is used for any controller components, details shall be submitted for approval.
- E. Wiring of the various external control and operating circuits shall be brought to a terminal board in the controller from where it shall continue to the various switches, solenoids and other devices on the panel. Connections of wires to terminals from external circuits shall be made with metal eyelets, solderless lugs or similar connectors. Starting and accelerating resistance shall be constructed of resistance wire or cast iron grids insulated with mica or other approved material and mounted to give constant pressure at all temperatures. If wire resistance is used, the material shall be capable of withstanding frequent heating and cooling cycles without excessive oxidation or crystallization and shall not be affected by atmospheric conditions. Resistance in connections with solenoids, etc., shall be wire, wound on noncombustible forms of insulating material and mounted so as to be readily renewable.
- F. Equipment shall be provided to protect the driving motor against overload and single phasing in all three (3) phases of the delta connection, protect the control equipment against overload and phase reversal.
- G. Where time delay relays are used in the circuits, they shall be of an acceptable design that is reliable and consistent, such as condenser timing or electronic timing circuits. No dash pot time relays shall be used.
- H. Each device on all panels shall be properly identified by name, letter or standard symbol which shall be neatly stencil painted (or otherwise marked), in an indelible and legible manner, on device or panel. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controllers, selectors and relay panels shall be neatly formed, laced and identified.

**2.10 MICROPROCESSOR CONTROL SYSTEM**

- A. Provide Motion Control elevator controller MCE i Control AC microprocessor based system with absolute position/speed feedback encoded tape to control the hoisting machine and signal functions in accordance with these specifications. Complete details of the components and printed circuit

boards, together with a complete operational description, shall be submitted for approval. All controller systems shall be non-proprietary and no special tool, including a hand held testing tool shall be necessary for adjustments or maintenance. The controller vendor shall be able to provide immediate tech support and be able to overnight mail any parts necessary for maintenance.

- B. All controller assemblies shall provide efficient, smooth, stepless acceleration and deceleration of the elevator hoisting machine, automatically and irrespective of the load in the car. All control equipment shall be enclosed in a metal cabinet with lockable, hinged door(s) and shall be provided with a means of ventilation. All non-conducting metal parts in the machine room shall be grounded in accordance with NEC. Cabinet shall be securely attached to the building structure.
- C. Circuit boards for the control of each elevator system, including dispatching, signals, door operation and special operation, shall be installed in a NEMA, Type 1, General Purpose Enclosure. Circuit boards shall be moisture-resistant, be non-corrosive, be nonconductive, be fabricated of noncombustible material and be of adequate thickness to support the components mounted thereon.
- D. Modules shall be the type that plug into pre-wired mounting racks. Field wiring or alteration shall not be necessary in order to replace defective modules.
- E. Each device, module and fuse (with ampere rating) shall be identified by name, letter or standard symbol in an approved indelible and legible manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams.
- F. The electrical connections between the printed circuit boards (modules) and the circuit connectors incorporated in the mounting racks shall be made through individual tabs which shall be an integral part of each module. The tabs shall be nickel-gold plated (or of other approved metal or equal electrical characteristics). Modules shall be keyed or notched so as to prevent insertion of the modules in the inverted position.
- G. Light emitting diodes (LEDS) shall be for visual monitoring of individual modules.
- H. Components shall have interlocking circuits to assure fail-safe operation and to prevent unwarranted elevator movement should any component fail to function properly.
- I. Method of wire wrapping for point to point with connections on the mounting racks shall be submitted for approval.
- J. Modules shall be of the type that plug into pre-wired mounting racks. Field wiring or alternation must not be required in order to replace defective modules.
- K. Field wiring changes required during construction shall be made only to the mounting rack connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules, they shall be returned to the factory where such design changes shall be made and module design records changes so that correct replacement units shall be available.
- L. Module boards shall be fabricated from nonconductive, non-corrosive material and shall be of sufficient strength so as to support all components mounted thereon without warping. Mounting racks shall be spaced sufficiently apart to prevent accidental contact between individual modules.
- M. All logic symbols and circuitry designations shall be in accordance with ASME Standards.

- N. Solid state components shall be designed to operate within a temperature range of 30 degrees F to 110 degrees F. No temperature controller or air conditioned rooms shall be required for proper operation of solid state components.
- O. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce through serrated washers shall not be acceptable.

#### **2.11 AUXILIARY POWER OPERATION; REUSE EXISTING**

- A. The control system for elevators P-1 through P-6 (one group) shall include provisions for operation on auxiliary power upon failure of the normal power supply.
- B. Auxiliary power supply, including its starting means and a transfer switch for transfer of power supply from normal to auxiliary is existing.
- C. Auxiliary equipment on elevator controllers, provide new wiring between associated elevator controllers.
- D. Upon loss of normal power supply, there shall be a delay before transferring to auxiliary power. When returning to normal power, there shall be a time delay when switching over from auxiliary to normal power.
- E. Upon return of normal power, an adjustable timed circuit shall be activated which will cause all cars to remain at the floor, if already there or stop if in flight. Actual transfer of power from auxiliary power to normal building power shall take place after car is stopped.

#### **2.12 VVVF MOTOR CONTROL WITH REGENERATIVE DRIVE:**

- A. Solid State Motor Control:
  - 1. Elevator control shall be affected by means of a compact solid state motor control unit for each elevator with electrical characteristics to suit the power supply. The system shall consist of the necessary three phase, full-wave bridge rectifiers and be fully regenerative.
  - 2. Solid state motor control unit shall operate with high efficiency and low power consumption, have sufficient capacity to handle peak currents typical of elevator service and contain a balanced, coordinated fault protection system which shall accomplish not less than the following:
    - a. Protect the complete power circuit and specifically the power semi-conductors from failure under short circuit (bolted fault) conditions.
    - b. Protect against limited faults arising from partial grounds, partial shorts in the motor armature or in the power unit itself.
    - c. Protect the drive motor against sustained overloads. A solid state overload circuit shall be used.
    - d. Protect motor and power unit against instantaneous peak overload.
    - e. Provide semi-conductor transient protection.
    - f. Provide phase sequence protection to insure incoming line is phased properly.
    - g. Removable printed circuit boards shall be provided for the VVVF control, designed tabs so boards cannot be reversed.

#### **2.13 GEARLESS TRACTION AC HOIST MACHINE**

- A. Provide new AC gearless traction machines that meet the requirements of ASME A17.1.

1. Gearless traction machine with AC motor, two individual brakes, (2:1 roping), drive sheave, and secondary sheave mounted in proper alignment on an isolated bedplate.
2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
3. Armature must be electrically balanced and together with motor coupling and brake, mechanically balanced.
4. It shall be possible to adjust the rate of acceleration and deceleration after installation is made. The final adjustment shall not produce any objectionable physiological effects on the passengers.
5. The structural design of the motor shall insure perfect alignment of bearings. The rotating elements shall be dynamically balanced to minimize vibration.
6. Hoist machine shaft shall be supported by two bearings mounted on a bedplate or integral with machine frame. Shaft shall be of forged steel or close grain electric furnace cast steel.
7. Drive sheaves shall be free from cracks, sand holes, and other imperfections that would tend to injure the cables. Sheave shall be turned smooth and true with cable grooves of proper design to insure maximum traction and maximum life of the cables.
8. Hoist machine brake shall have the capacity to hold the elevator with 125 percent of rated load. Arrange brake circuits so that no current will be applied to the brake coil prior to the establishment of the hoistway door interlock circuit.

#### **2.14 SHEAVES**

- A. Provide new secondary, car top and counterweight sheaves that are compatible with new hoist ropes and meet the requirements of the machine and wire rope manufacturers.
- B. Provide cable guards that will prevent cables from jumping off sheaves during testing, normal operation and cover pinch points.

#### **2.15 MACHINE BEAMS - RETAIN EXISTING**

#### **2.16 CAR AND COUNTERWEIGHT GUIDE RAILS**

- A. Retain existing car and counterweight guide rails and brackets.
- B. Thoroughly clean all guide rails of grease, oil, rust and other foreign substances. File and remove all rough edges and surfaces and tighten bracket bolts and guide clips for smooth and quiet operation of car and counterweight.
- C. Provide any required rail backing and/or intermediate tie brackets to comply with ASME Code for bracket spacing for both car and counterweight rails.

#### **2.17 ROLLER GUIDES FOR CAR AND COUNTERWEIGHT: NEW**

- A. Provide car and counterweight with new roller guides.
- B. Each guide shall be an approved type consisting of not less than 6 wheels for car and 3 wheels for counterweight, each with durable, resilient oil resistant material with tires rotating on ball bearings sealed in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. The wheels shall be of ample diameter and shall run on three machined finished dry rail surfaces. Secure the roller guides on each side of the car and counterweight frame. All mounting bolts shall be fitted with nuts, flat washers, split lock washers and if required, beveled washers.

- C. Provide sheet metal guards to protect wheels on top of car and counterweights.

**2.18 CAR AND COUNTERWEIGHT BUFFERS:**

- A. Reuse existing main and counterweight pit channels and buffers. Install new counterweight buffers on Elevators P-1, P-2. Install new buffer switches with new wiring on all buffers.
- B. New oil buffers shall meet requirements of ASME A17.1, Rule 2.22.4 oil buffers.

**2.19 COUNTERWEIGHTS: EXISTING TO BE RETAINED.**

- A. The counterweights shall be cleaned and all missing or damaged bolts, tie rods, frames, and members shall be replaced.
- B. Sub weights shall be added to or removed from the counterweights frame to provide a counterbalance equal to the weight of the complete car and approximately 40 percent of the rated capacity. New sub weights shall be sectional cast iron, flame cut hot rolled steel or cast lead. Test for this balance shall be witnessed in the presence of and as directed by the COR.

**2.20 HOISTING ROPES;**

- A. Provide new hoist cables.
- B. Ropes to meet ASME A17.1 Elevator Code.
- C. Replace existing shackles with wedge type shackles.
- D. Provide elevator with the required number and size of ropes to insure adequate traction for the range of loads with a factor of safety not less than required by ASME A17.1 Code. Hoisting ropes shall have a special traction steel, preformed, with a diameter to match hoist machine.
- E. Attach a corrosion resistant metal tag to one of the hoisting rope fastening. Tag shall bear data as required by ASME A17.1 Code.

**2.21 GOVERNOR ROPE: NEW**

- A. New governor ropes shall be 6 X 19 or 8 X 19 wire rope, iron or traction steel, undercoated with fiber core.
- B. Under normal operation, rope shall run free and clear of governor jaws, rope guards and other stationary parts.
- C. Governor rope tag shall be securely attached to governor rope releasing carrier. Data tag shall be corrosion-resistant metal and shall bear data as required by the Code.

**2.22 COMPENSATION:**

- A. Remove existing compensation cables, sheaves and switches.
- B. Replace with new "whisper flex" encapsulated chains.

**2.23 SAFETY DEVICE: REUSE EXISTING**

- A. Clean safety devices, re-adjust to comply with current requirements of the code.
- B. A permanently attached metal data tag shall be applied to each safety device bearing the information required by ASME A17.1.
- C. May reuse existing safety operated switch (SOS).
- D. Field test of car safety and governor shall be as specified in the Section entitled "TESTS" of these specifications.

#### **2.24 OVERSPEED GOVERNORS:**

- A. Replace all existing governors with new centrifugal type governors. Provide new over speed and speed reducing switches.
- B. Over speed and speed reducing switches to work as required by ASME A17.1 code. Switches shall operate in both directions.
- C. The governor rope clamping device shall be adjusted so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the safety. The grip jaws shall be of such shape and length that pull-through action of the governor rope, as required by Code, will result in a minimum amount of rope abrasion.
- D. Install all new governor pit sheaves and weights.
- E. No field painting of governor parts shall be permitted.
- F. Move location of governors from secondary area to machine room. Elevator P-5 governor is already in machine room.

#### **2.25 NORMAL AND FINAL TERMINAL STOPPING DEVICES: PROVIDE NEW:**

- A. Normal and final terminal stopping devices shall conform with the Code.
- B. Mount normal stopping switch on car or in hoistway to slow speed of car and bring it to an automatic stop level with the terminal landings.
  - 1. Switch shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.
  - 2. Switch, when opened, shall permit operation of car in reverse direction.
  - 3. No normal stopping device, other than one mounted on car and activated by cams in hoistway, or mounted in hoistway and activated by cams on car, shall be permitted.
- C. Mount final terminal stopping switches in the hoistway.
  - 1. Switches shall be positively opened by car should the car travel beyond the normal stopping switches.
  - 2. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake and prevent operation of car in either direction.

#### **2.26 WORKMAN'S LIGHTS AND OUTLETS: NEW**

- A. Provide lamps with wire guards on top of each elevator car and beneath the platform.

#### **2.27 TOP-OF-THE CAR OPERATING DEVICE: NEW**

- A. The device shall conform to ASME A17.1, Section 2.26.
- B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 1/4-inch letters.
- C. Movement of the elevator shall be accomplished by the continuous pressure on a direction button and a safety button.
- D. Provide an emergency stop toggle switch.
- E. Provide permanent identification for the operation of all components in the device.
- F. The device shall be permanently attached to the elevator cross head on the side of the elevator nearest to the hoistway doors used for accessing the top of the car.

**2.28 CAR LEVELING DEVICE: PROVIDE NEW:**

- A. Car shall be equipped with a two-way leveling device to automatically bring the car to within 1/8 inch of exact level with landing for which a stop is initiated regardless of load in car or direction of travel.
- B. Car shall, at all times, level into the floor and shall not stop above or below the floor and level back.
- C. The automatic leveling device shall, within its zone, be entirely independent of the operating device and if the car stops short or travels beyond the floor, the leveling device shall automatically correct this condition and maintain the car within plus or minus 1/8 inch of level with the floor landing regardless of the load carried and its stretching effect on the cables during loading and unloading.
- D. A car leveling device functioning through the medium of vacuum tubes or photoelectric tubes is not acceptable. Approved permanent magnet, electromagnetic, encoder, or selector type leveling is required.

**2.29 EMERGENCY STOP SWITCHES: NEW**

- A. Emergency stop switches shall conform to the Code.
- B. Each stop switch shall be red in color and shall have its "identity" and "STOP" and "RUN" positions legibly and indelibly identified.
- C. Provide new pit switches for all elevators. Elevators have walk in pits. Locate pit switch 4 feet above lowest floor landing by walk in pit door and on pit wall in front of each elevator.

**2.30 OPERATING DEVICE FACEPLATES; NEW**

- A. Fabricate faceplates for all elevator operating and signal devices from not less than 1/8-inch thick flat stainless steel with all edges beveled at least 15 degrees. Install all faceplates flush with surface upon which they are mounted.
- B. The centerline of the landing push-button fixtures for passenger elevators shall be 42 inches centerline. The new push button plate shall be at least 5 inches wide by 12 inches high.
- C. Fasten all car and corridor operating device and signal device faceplates with non-corrosive white metal spanner head or bristol head tamperproof screws.
- D. Elevator corridor call station pictograph shall be engraved in the faceplate at all floors.
- E. Design car and corridor pushbutton faceplates so that pressure on pushbuttons shall be independent of pressure on pushbutton contacts.
- F. Engraved legends in faceplates shall have lettering 1/4-inch high filled with black paint.
- G. Provide braille on pushbutton faceplates. Surfaced mounted plates are not acceptable.
- H. Disconnect and remove existing first floor auxiliary power box. Cover box hole with a stainless steel plate.

**2.31 OPERATING DEVICES AT HOISTWAY LANDINGS: EXISTING TO BE REMOVED**

- A. Provide 2 sets of new landing call buttons and fixture plates. DO NOT INSTALL VANDAL PROOF BUTTONS.
- B. Fixtures for intermediate landings shall contain "UP" and "DOWN" buttons. Fixtures for terminal landings shall contain a single "UP" or "DOWN" button.
- C. The direction of each button shall be legibly and indelibly identified by arrows not less than 1/2 inch high in the face of each button.

- D. Each button shall contain an integral registration light that shall illuminate upon registration of a call and shall extinguish when the call is answered. Install LED type light bulbs, white in color, in hall pushbuttons.
- E. If a landing button is operated while the car and hoistway doors are closing at that floor, the call shall be registered for the next elevator. Calls so registered shall be canceled if closing doors are re-opened by means of "DOOR OPEN" button, or infrared curtain unit.

## **2.32 MAIN CAR OPERATING PANEL**

- A. Locate the main car operating panel in the car enclosure on the front return panel for elevators. The top floor car call push button shall not be more than 1220 mm (48 in.) above the finished floor. Car call push buttons and indicator lights shall be round with a minimum diameter of 25 mm (1 in.), LED white light illuminated.
- B. One piece front faceplate, with edges beveled 15 degrees, shall have the firefighters' service panel recessed into the upper section and the service operation panel recessed into the lower section, fitted with hinged doors. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with cylinder type key operated locks. Secure the faceplate with stainless steel tamperproof screws.
- C. All terminology on the main car operating panel shall be raised or engraved. Use 6 mm (1/4 in.) letters to identify all devices in upper section of the main car operating panel. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.
- D. The upper section shall contain the following items in order listed from top to bottom:
  - 1. Engrave elevator number, 25 mm (1 in.) high with black paint for contrast.
  - 2. Engrave capacity plate information with black paint for contrast with freight loading class and number of passengers allowed.
  - 3. Emergency car lighting system consisting of a rechargeable battery, charger, controls, and LED illuminated light fixture. The system shall automatically provide emergency light in the car upon failure or interruption of the normal car lighting service, and function irrespective of the position of the light control switch in the car. The system shall be capable of maintaining a minimum illumination of 1.0 foot-candle when measured 1220 mm (48 in.) above the car floor and approximately 305 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.
  - 4. LED illuminated digital car position indicator with direction arrows. Digital display floor numbers and direction arrows shall be a minimum of 50mm (2 in.) high.
  - 5. Firefighters' Emergency Operation Panel shall conform to the requirements of ASME A17.1 Section 2.27. Firefighters' Panel shall be 1676 mm (66 in.) minimum to 1830 mm (72 in.) maximum to the top of the panel above finished floor.
  - 6. Firefighters' Emergency Indicator Light shall be round with a minimum diameter of 25 mm (1 in.).
  - 7. Key operated Independent Service blank core. VA to provide core key switch see Section 2.36 for detailed description.
  - 8. Complete set of round car call push buttons, minimum diameter of 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call buttons shall be legibly and indelibly identified by a floor number



and/or letter not less than 12mm (1/2 in.) high in the face of the call button. Elevator P-5. Install 'PH' FLOOR PUSH BUTTON. Install a key switch next to "PH" push button. Key switch must be activated before pushing push button. Provide blank core for this key switch. VA will install correct key core switch. DO NOT INSTALL VANDAL PROOF BUTTONS.

9. Door Open and Door Close buttons shall be located below the car call buttons. They shall have "OPEN" and "CLOSE" legibly and indelibly identified by letters in the face of the respective button. The Door Open button shall be located closest to the door jamb as required by ADA.
  10. Red Emergency Alarm button that shall be located below the car operating buttons. Mount the emergency alarm button not lower than 890 mm (35 in.) above the finished floor. It shall be connected to audible signaling devices as required by A17.1 Rule 2.27.1.2. Provide audible signaling devices including the necessary wiring.
  11. Emergency Help push button shall activate two way communications by Auto Dial telephone system as required by ASME A17.1 Rule 2.27.1.1.3. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12 mm (1/2 in.) high letters. Engrave "PUSH TO TALK" above the button
  12. Provide a corresponding Braille plate on the left side of each button. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.
- E. The service operation panel, in the lower section shall contain the following items:
1. Light switch labeled "LIGHTS" for controlling interior car lighting with its two position toggle switch marked "ON" and "OFF".
  2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch shall be labeled "INSPECTION" with its two position toggle switch marked "ON" and "OFF".
  3. Three position toggle switch labeled "FAN" with its positions marked "HIGH", "LOW" and "OFF" for controlling car ventilating blower.
  4. Two position, spring return, toggle switch or push button to test the emergency light and alarm device. It shall be labeled "TEST EMERGENCY LIGHT AND ALARM".
  5. Two position emergency stop switch, when operated, shall interrupt power supply and stop the elevator independently of regular operating devices. Emergency stop switch shall be marked "PULL TO STOP" and "PUSH TO RUN".

## **2.33 AUXILIARY CAR OPERATING PANEL**

- A. Provide an auxiliary car operating panel in the front return panel opposite the main car operating panel. The auxiliary car operating panel shall contain only those controls essential to passenger (public) operation. The auxiliary car operating panel faceplate shall match the main car operating panel faceplate in material and general design. Secure the faceplate with stainless steel tamperproof screws.
1. Mount door "OPEN" and door "CLOSE" buttons closest to the door jamb and mount the alarm button no lower than 875 mm (35 in.) above the finished floor. The Door Open button shall be located closest to the door as required by ADA.
  2. Complete set of round car call push buttons, minimum diameter 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call button shall be legibly and indelibly identified by a floor number and/or letter not less than 12 mm (1/2 in.) high in the

face of the call button corresponding to the numbers of the main car operating buttons. DO NOT INSTALL VANDAL PROOF BUTTONS.

3. Elevator P-5. Do not install a push button or key core in panel for floor "PH".
4. The auxiliary car operating panel faceplate shall match the main car operating panel faceplate in material and general design. Secure the faceplate with non-corrosive white metal spanner head or bristol head tamperproof screws.
5. Cross-connect all buttons in the auxiliary car operating panels to their corresponding buttons in the main car operating panel. Registration of a car call shall cause the corresponding button to illuminate in the main and auxiliary car operating panel.
6. Emergency Help push button shall activate two way communications by Auto Dial telephone system as required by ASME A17.1 Rule 2.27.1.1.3. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12 mm (1/2 in.) high letters. Install emergency telephone system in the auxiliary car operating panel. Engrave "PUSH TO TALK" above button.
7. Provide a corresponding Braille plate on the left side of each button. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.

#### **2.34 GROUP AUTOMATIC OPERATION**

- A. Elevators P-1 through P-6 shall have group automatic operation and shall operate in a single group.
- B. Basic operating devices shall consist of dispatch buttons in each car, landing call buttons and a group supervisory control system, all electrically connected to the control equipment governing selection of landing stops to be made, direction of travel, starting, acceleration, deceleration and stopping of the elevator car and the systematic dispatching operations of the elevators as specified herein.
- C. Upon entering car, passengers shall press car button corresponding to landings to which they wish to go. After hoistway door interlock and car door landing circuits are established, car shall automatically start, accelerate, decelerate and stop at first landing for which car dispatch button has been pressed or for which landing calls have been registered corresponding to the direction in which car is traveling. Car shall then continue to serve remaining car dispatch and landing calls with car stops being made in order in which landings are reached irrespective of the sequence in which buttons are pressed, provided that button for landing has been pressed sufficiently in advance of car arrival at that landing to permit car to slow down and stop. Only one car, the nearest one traveling the appropriate direction, shall stop in response to a landing button call.
- D. If first car approaching floor in direction for which landing call button has been pressed is traveling nonstop because of action of independent service operation, landing call shall be automatically transferred and served by next car approaching landing in desired direction.
- E. Simultaneous to the initiation of the slowdown of a car for a landing call, the call shall be automatically canceled. Calls registered on car buttons shall be canceled in the same manner.
- F. When car arrives at intermediate landing, hoistway door and car door shall open automatically and shall remain open for predetermined adjustable time interval. The time interval at intermediate landings shall be less for a

stop in response to a car call than for a stop in response to a landing call and shall be shortened upon completion of the transfer of passengers or upon the operation of a door close button in the respective car. After expiration of time interval, hoistway doors and car door shall close automatically and car shall proceed to answer registered calls. The time interval at a dispatching terminal shall be as specified, here in, under the group supervisory control system. Hall push button calls shall hold doors open for 7 seconds and car operating panel button calls shall hold doors open for 5 seconds.

- G. Any landing call which is not answered within an adjustable time (approximately 60 seconds) shall cause preferential service to be dispatched to the individual call or to the zone which contains that unanswered call.
- H. A car that has no car calls registered arriving at a floor where both up and down landing calls are registered will initially respond to the landing call in the direction that the car was traveling and if no car call in that direction registered within a predetermined, adjustable period, that car will respond to the change of direction and the lantern gong will sound.
- I. Hall position indicators shall always show the direction in which the car will next travel.
- J. Car Lights and Blowers Lights and blower in the elevator shall be wired so that they will not shut-off when elevator is idle.
- K. Delayed Car: When any car becomes shut-down or delayed for a predetermined time interval after it receives start signal, system shall automatically permit remaining cars in group to respond to signals and to be dispatched in normal manner. When cause of delay is corrected, car shall automatically resume normal operation, unless it has been manually removed from system.

## **2.35 GROUP SUPERVISORY SYSTEM**

- A. Group supervisory control system for elevators P-1 through P-6 shall govern the movement of the individual car in the group in a fully zoned system to provide the maximum efficiency in serving the hospital traffic demands. The system shall electronically calculate and continuously evaluate the varying traffic demands and automatically change the method of dispatching or send cars to various sections of the hospital as appropriate, to provide an effective response to the landing calls of prevalent traffic. The system shall function to accommodate the anticipated varying hospital traffic demands and be sufficiently flexible so that it can be modified to accommodate changes in traffic patterns.
  - 1. The system shall be arranged to maintain movement of car to satisfy all traffic demands which occur throughout the day. The system shall function on the basis of conditions as they exist at the present time and not on conditions as measured in a receding time period.
  - 2. Any car, after satisfying all car calls and corridor calls in its direction of travel, shall become available for immediate dispatch to any part of the hospital where demand exists regardless of location or direction of travel. No car shall invariably make a through trip to either terminal unless a demand exists at that terminal
  - 3. The system shall always dispatch an available car to the main dispatching terminal when no other car is at or approaching this floor.
  - 4. Cars shall be selected for dispatch by a non-sequence selection system. The system shall select from available cars and assign car for loading. Cars shall be selected substantially in the order of arrival at the dispatching terminal.
- B. Two-way dispatching shall function during periods of appreciable traffic demand in both the up and down directions. The cars shall be dispatched up

or down as appropriate to respond to the prevailing traffic demand. Each car shall answer unassigned landing calls ahead of it in its direction of travel until all calls not subject to lead bypass have been answered. The method of dispatching shall include:

1. Dispatching the cars from predetermined zones consisting of an approximate division of the floors served by the number of elevators in the (respective) group unless the anticipated traffic demands should dictate otherwise. A car, after responding to the last call in an unoccupied zone, shall become the available car for that zone. Other cars that become available shall be assigned to other zones. Available cars shall respond immediately to a demand in an unoccupied zone, or if the demand in a zone exceeds an adjustable predetermined number, an additional available car shall be dispatched to that zone.
  2. Dispatching the cars from landings at which they become available. A car, after answering its last call, shall become available at the landing at which it made its last stop. Available cars at any landing shall be assigned and dispatched to answer service demands in a manner which shall provide equitable service to all floors.
  3. An available car without a demand for service shall park with its doors closed.
  4. The dispatching method shall be sufficiently flexible to provide efficient service for two-way traffic that becomes predominant in either the up or down direction.
- C. Off-hour dispatching shall function when the traffic demands subside to a degree of very light or inactive status. As the cars become inactive, they shall park with doors closed in assigned zones or seek an unoccupied zone. Two car shall be stationed at the first floor with doors closed and hall position indicator light illuminated. When a demand for service occurs, the car or cars in the zone of demand shall be placed back in service automatically in order to satisfy the demand

## **2.36 INDEPENDENT SERVICE**

- A. A two-position key operated "INDEPENDENT SERVICE" switch shall be provided in the main car operating panel which shall have its positions marked "ON" and "OFF". Provide a blank core. VA to provide correct core and key switch. When the switch is in the "ON" position, the car shall respond only to calls registered on its car dispatch and shall bypass all calls registered on landing push-buttons. Car and hoistway doors shall not close until a car button or the "DOOR CLOSE" button is pressed and held until interlock circuits are made up. When switch is returned to "OFF" position, normal service shall be resumed. In addition, the elevator shall be disconnected from the automatic dispatching system and the hall position indicators and the highest call reversal shall not be effective.

## **2.37 FIRE SERVICE: REUSE EXISTING**

- A. Provide fire service as per the ASME A17.1 Code.
- B. Elevators P-1 through P-6 (one group), reuse existing machine room and lobby smoke detectors.
- C. Smoke Detectors: When a machine room smoke detector or lobby smoke detector is activated, all 10 of the elevators in that passenger and service group or bank shall respond to phase one fire recall.
- D. Upon activation of an elevator lobby or machine room smoke detection device, a signal shall be transmitted to the building fire alarm control panel. The alarm signal shall be transmitted from the fire panel to the elevator controller which shall activate the "PHASE ONE FIRE SERVICE" operation. The alarm signal shall be received from any group elevator lobby or machine room smoke detector except the smoke detector located at the main floor lobby.

The main floor (First Floor) lobby smoke detector shall send the elevators to a designated alternate floor (Ground).

- E. When an alarm signal initiates Phase one operation, momentary movement of the "FIRE SERVICE" key in the lobby hall push button plate to the "RESET" position shall be required to return elevators to automatic operation if alarm signal is cleared.
- F. Install new fire service switch in main first floor hall push button plate.
- G. First floor is main fire floor and Ground floor is alternate fire service floor.

#### 2.38 HEAT DETECTORS, SHUNT TRIP CIRCUIT BREAKERS; REUSE EXISTING

- A. Shunt trip circuit breakers located in machine room.
- B. Reuse existing heat detectors in elevator machine room in accordance with NFPA 72 Code.
- C. The heat detectors shall be connected to the fire alarm control panel. When activated by the heat detectors, the fire alarm control panel shall send a supervised signal to the elevator machine room in the form of a relay with a set of 110 Volt "C" for each contacts elevator. The 110 volt circuit to be on emergency power system. The relay shall be located in the machine room. Power shall be removed from each elevator controller by activating an independently controlled shunt trip circuit breaker when the temperature in the machine room exceeds the setting of the heat detector.
- D. The heat detector system shall be independent of the fire service system.

#### 2.39 AUDIO VOICE SYSTEM: NEW

- A. Provide new audio voice system activated by stopping or passing a floor. Audio voice to give floor designations. The voice announcer shall be a digitized floor announcer that will announce the floor numbers and direction of travel and special announcements. The voice announcer shall be a natural human voice that recites messages and shall comply with ADA requirements for audible car position indicators. The voice announcer shall be a full range loudspeaker to be located on top of the cab or in the main car operating panel as directed by the COR. The voice announcer unit shall contain 21 ports which can accommodate 21 standard floors and direction messages. Install voice announcer per manufacturer's recommendations and instructions. The voice announcer shall be the product of one manufacturer of established reputation. Provide manufacturer literature and list of voice messages. Provide special messages as directed by COR.

1. Fire service message. "This elevator is out of service for a fire service emergency. Please evacuate the elevator".

2. "Please do not block doors".

3. Provide any special messages as directed by COR.

#### 2.40 CAR POSITION INDICATOR

- A. Provide an L.E.D. digital type of car position indicator for elevators. Locate in main car operating panel. L.E.D. digital readouts for floor numbers and direction arrows shall be a minimum of 2 inches high. Remove existing car position.

#### 2.41 HALL POSITION INDICATOR:

- A. Remove and replace existing hall position indicators and hall lanterns. Provide new L.E.D. digital type hall position indicators at all floors. Locate above top of door entrance jamb. Provide stainless steel plate to cover any existing boxes. Hall position indicators shall match the hall position indicators located in Building 258. Hall position direction indicators shall be equipped with a clearly audible gong that shall sound

once for "UPWARD" bound car and twice for "DOWNWARD" bound car when landing at floor. Audible signal shall not sound when a car passes the floor without stopping.

#### **2.42 MACHINE ROOM INDICATOR PANEL:**

- A. Disconnect and remove existing machine room large indicator panel. Remove all wiring and piping.
- B. Provide Motion Control Elevator "iView" Monitor Diagnostic System. Locate in a controller or in a lockable enclosure.
  - 1. The contractor shall provide for "troubleshooting" shutdowns and elevator problems to be displayed on i Monitor. This shall consist of total diagnostics of operation.
- C. The "iView" Monitor system shall also contain illuminated indicators to provide the following information:
  - 1. The floor where each elevator is currently located.
  - 2. The direction in which each elevator is currently traveling or is scheduled to travel.
  - 3. The location and direction of each currently registered hall call. These lamps shall extinguish as each call is answered.
  - 4. Which elevator is currently out of service.
  - 5. Which elevator is currently bypassing hall calls.
  - 6. Which elevator is currently engaged in passenger transfers.
  - 7. Operations program under which entire group is currently operating.
  - 8. Zone divisions of the entire group.

#### **2.43 HOISTWAY ACCESS SWITCHES: NEW**

- A. Remove existing top and bottom floor access switches from door jambs.
- B. Provide hoistway access switches for elevator at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Elevators with center opening doors, mount the access key switch 1830 mm (6 ft) above the corridor floor next to the hoistway entrance jamb. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions. Submit design and location of access switches for approval. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor.
- C. Provide emergency access for all hoistway entrances, keyways for passenger elevators.

#### **2.44 HOISTWAY ENTRANCES: RETAIN EXISTING**

- A. Reuse existing entrances frames and re-skin with new stainless steel covering both sides of curved door jamb and header entrances. Reuse existing sills, hanger supports, strut angles and fascia plates.
- B. Remove existing and provide new door tracks, stainless steel hoistway doors, door rollers, hangers, pick up and release arms, beaks and rollers, door gibs, bumpers and door closers.

- C. Provide hoistway entrance with new flush center opening hoistway doors. Door panels shall be not less than 16-gauge stainless steel, flush type construction, and not less than 32 mm (1 1/4 in.) thick. Wrap stainless steel around the leading and trailing edges of the door panel. Top and bottom of door panels shall have continuous stiffener channels welded in place. Reinforcement of the door panels shall be approximately 1.0 mm (0.04 in.) in thickness and of the hat section type. At bottom of each and every panel, provide two removable laminated phenolic gibs or other approved material guides and a separate fire gib. Reinforce each door panel for hangers, interlock mechanism, drive assembly, and closer. One door panel for each entrance shall bear a BOCA label, Underwriters' label, or in lieu of this, labels from other accredited test laboratories may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR. Fasten sight guard of 14-gauge stainless steel, extending full height of panel, to leading edge of each panel of center opening doors.
- D. Provide hangers for hoistway door panels and provide relating devices to transmit motion from one door panel to the other. Fasten the hangers to the door sections. Provide reinforcements at the point of attachment. The hanger shall have provisions for vertical and lateral adjustments. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 76 mm (3 in.) in diameter, with rubber or non-metallic sound-reducing tires mounted on a malleable iron or steel bracket. The hanger sheaves shall operate at a relatively low rotational speed, and shall roll on a high-carbon, cold-rolled or drawn steel track shaped to permit free movement of sheaves without regard to vertical adjustment of sheave, bracket or housing. Beneath the track and each hanger sheave, provide a hardened steel up-thrust roller capable of withstanding a vertical thrust equal to the carrying capacity of adjacent upper sheave. The up-thrust shall have fine vertical adjustments, and the face of the roller shaped so as to permit free movement of the hanger sheave. The up-thrust roller shall have ball or roller bearings. Provide the hanger sheaves with steel fire stops to prevent disengagement from tracks.
- E. Do not use hangers that are constructed integrally with the door panels.
- F. Provide raised numerals on cast, rear mounted plates for all openings. Numerals shall be a minimum of 50 mm (2 in.) high, located on each side of entrance frame, with centerline of 1524 mm (5 ft) above the landing sill. The number plates shall contain Braille.
- G. Provide unique car number on every elevator entrance at designated main fire service floor level, minimum 76 mm (3 in.) in height.
- H. Install drop key escusion holes on all hoistway doors.
- I. Replace any missing hoistway dust covers.

#### 2.45 ELECTRIC POWER DOOR OPERATORS: PROVIDE NEW

- A. Provide new heavy duty, high speed door operator, header, tracks, arms, etc. with a new door operator. Door operator shall automatically open the car and hoistway doors simultaneously when the car is level and automatically close the doors simultaneously at the expiration of the open timing. Motor shall be of the high internal resistance type, capable of withstanding high currents resulting from stall without damage to the motor. The door operator shall be capable of opening a car door and hoistway door simultaneously at a maximum speed of not less than 2 feet per second. The closing speed shall be one foot per second. A reversal of direction of the doors from the closing to opening operation whether initiated by the infrared curtain unit, or the door open button, shall be accomplished within no more than 1-1/2 inches of door movement. Particular emphasis is to be placed on obtaining quiet interlock and door operation and smooth, fast, dynamic braking for door reversals and stopping of the doors at both extremes of travel. All levers operating the doors shall be constructed of

heavy steel members and all pivot points shall have ball or roller bearings. Electric power shall be used to open and close the doors. Springs may be used for auxiliary automatic door closers required under Rule 2.11.3 of the Code.

- B. Door operator shall open and close both car and hoistway door simultaneously. Inherent design and installation of door operating devices shall be such as to preclude possibility of any hoistway door panel being disengaged from operating devices under any condition of operation of cars. Doors shall open automatically when car has stopped at landing. Doors shall be synchronized with operation of leveling car and opening car and hoistway doors simultaneously. Car and hoistway doors shall close automatically after an adjustable predetermined time sufficient to allow passengers to enter and leave the car. Before the interlock circuit is established, hoistway door for landing shall lock and remain in closed position until the car makes another stop at that landing.
- C. Door shall operate smoothly and without slam in opening and closing directions and shall be cushioned in final movement in each direction of travel by regulated and adjustable electric power or other equally effective means. No electrical power shall be required to hold doors either open or closed. Hoistway doors shall be provided with door closers arranged to close open doors automatically if car for any reason leaves landing zone. In case of interruption or failure of electric power, mechanism shall permit manual opening from within car at door zone only. Door operator shall operate in conjunction with, incorporate in its design, or be equipped with interlocks or safety switches. It shall not be possible for the doors to open by power unless the elevator is within the leveling zone. Elevator, when out of the leveling zone, is restricted to 4 inch opening. Provide door locking device as per code.
- D. Provide new infrared curtain units for all elevators. The device shall cause the car and hoistway doors to reverse automatically to the fully open position should the unit be actuated while the doors are closing. Curtain unit shall function at all times when the doors are not closed, irrespective of all other operating features.
- E. Should the doors be prevented from closing for more than a predetermined adjustable interval of 30 to 60 seconds by operation of the curtain unit or door open button, these devices shall be rendered unable to cause door reversals, the doors shall stay open, a buzzer located on the car shall sound and a audio voice message will say "Please do not block the doors". Doors shall not close on "nudging".
- F. Provide car and hoistway door open and close buttons. When the door open button is pressed, the doors, if in the open position, shall remain open, or if the doors are closing, they shall stop, reverse and re-open. Momentary pressure of the door close button shall initiate the closing of the doors prior to the expiration of the normal door open time. The open and close buttons shall be located in the car operating station below the floor buttons. The door open button shall be located adjacent to the door opening.
- G. Should the doors be prevented from closing by an obstruction, that does not activate a door re-opening device, for more than an adjustable interval of 15 to 60 seconds, the doors shall automatically reverse to the fully opened position.
- H. Provide new door clutch and related door equipment.

#### **2.46 ELECTRIC INTERLOCKS: NEW**

- A. Replace each hoistway door interlock with a new interlock functioning as a hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position as defined by the Code. Interlock shall prevent opening of hoistway door from corridor side, unless car is at rest



at landing, is operating in leveling zone at landing, or hoistway access switch is used.

- B. Hoistway door interlock shall not be accepted unless it has successfully met requirements of Rule 2.12.6 of the Code. Approved devices shall be securely fastened to the car and shall be arranged to operate the interlocks without objectionable noise, shock or jar.
- C. New wiring installed from the hoistway riser to each door interlock shall be NEC Type SF-2 or equal.
- D. Equip car doors with electric contact which prevents operation of car until door is closed as defined in the Code, unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car. Car door contact shall not be accepted unless it has successfully met requirements of Rule 2.12.6 of the Code.
- E. Provide devices, either mechanical or electrical, which shall prevent operation of the elevator in event an accident to or defective door operator equipment has permitted an independent door panel to remain in the "UNCLOSED" or "UNLOCKED" position.

#### **2.47 CAR SLING: REUSE EXISTING CAR SLINGS**

- A. Present car frame shall be checked for proper alignment and correct if necessary. All bolt connections shall be checked, tightened or replaced, where necessary.
- B. Reuse existing safety operating switch (SOS) switch on top of car.

#### **2.48 CAR PLATFORM:**

- A. Reuse existing platform. Remove existing floor tile. If any damage to floor tile during renovation. Replace floor tile to be the same as existing now.
- b. Reuse existing car sills.
- C. Install new toe guard to meet A17.1 Elevator Code.

#### **2.49 CAR ENCLOSURE FOR PASSENGER ELEVATORS**

- A. Reuse existing cab. Re-skin existing front return panels and transoms. Stainless steel to match existing.
- B. Cover existing bottom half of cab with new stainless steel sheet covering. It shall be one piece covering for each wall with no seams. Remove existing side and rear laminated insert panels. Provide new side and rear wall laminate panel. New panels from top of stainless steel up to ceiling shall be covered with high pressure plastic laminate. Apply the plastic laminate to a minimum thickness of 1/2 inch fired rated particle board. Submit a method of fastening particle board to steel wall. VAMC shall pick type and color of new laminate.
  - 1. All joints shall be smooth and flush, with no ragged or broken edges.
- C. Remove existing drop ceiling and lighting. Repaint dome bright white. Install new drop ceiling with flat plastic laminate and egg crate type panels in new aluminum frame. Provide stainless steel hanging ceiling frame. Construct frame of 1/8 in. x 1 1/2 in. x 1 1/2 in. "T" and "L" sections, divide ceiling into six panels.
- D. Lighting for passenger elevators.
  - 1. Provide fluorescent or LED illuminated car light fixtures above the ceiling panels. Install 4 sets of T-8 fluorescent light tubes 4 ft long with new electronic ballasts.
- E. Remove existing cab handrails. Provide car enclosure with two sets of stainless steel handrails.

1. 75 mm (3 in.) wide x 9 mm (3/8 in.) thick flatstock located with centerlines 750 mm and 1050 mm (30 in. and 42 in.) above the car floor.
2. Locate handrails 38 mm (1 1/2 in.) from cab wall. Install handrails on two side and rear walls. Curve ends of handrails to walls. Conceal all handrail fastenings. Handrails shall be removable from inside the car enclosure.
- F. Provide a stainless steel capacity plate in each elevator car. Capacity plate shall be conspicuously located on the front return panel containing the car operating panel. Plate shall show the rated capacity of the elevator in pounds with engraved or cast letters not less than 1/4-inch high. Engraved letters shall be filled with black paint. The capacity may be engraved in the main car operating panel faceplate in lieu of a separate capacity plate
- G. New emergency car lighting system. Install in new main car operating panel.
- H. Remove existing fan blower. Provide a blower unit arranged to exhaust through an opening in the canopy. Provide a stainless or chrome plated fan grill around the opening. Provide 2-speed fan, capable of rated free delivery air displacement of approximately 380 and 700 cfm at respective speeds. Mount fan on top of car with rubber isolation to prevent transmission of vibration to car structure. Provide screening over intake and exhaust end of blower. Provide a 3-position switch to control the unit in the service panel.
- I. Remove existing electrical outlet in cab located below main car operating panel. Install new GFI electrical outlets with stainless steel faceplates where existing outlets are now located.
- J. Install new emergency exit electrical contact switch to prevent operation of elevator when emergency exit is open.
- K. Provide elevators with new side opening horizontal sliding car doors. Construct door panels to be flush hollow metal construction, not less than one inch thick, consisting of not less than one piece continuous, 16 gauge stainless steel on car face side and leading and trailing edges. Separate by two plates of sound deadening material, and reinforce by steel shapes welded to the plates at frequent intervals. Reinforce panels as required for installation of hanger, power operating and door opening devices. Hang doors on two point suspension hangers having ball bearing sheaves not less than 3 inches in diameter, with rubber or non-metallic sound reducing tires. Equip hangers with adjustable ball bearing rollers to take up thrust of panels. Up thrust roller shall be capable of being locked in position after adjustments to a maximum of 0.015 inch clearance. Provide two non-metallic gibs on each door panel. Gibs shall be replaceable without removal of door panel.
- L. Install handrails on top of cab for safety. Provide as per National Elevator

#### 2.50 INTERCOM AUTO DIAL SYSTEM; NEW

- A. Remove existing auto dial system from cab.
- B. Furnish and install a complete ADA compliant auto dial phone intercommunication system.
- C. Provide a two-way communication device in the car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. When activated by the "PUSH TO TALK" button located in both the main and auxiliary car operating panels, the auto dial shall automatically dial to the OPERATOR. Provide dialer with automatic rollover capability with minimum two numbers.
- D. The "PUSH TO TALK" button shall illuminate and flash when call is acknowledged. Button shall match floor push button design.

- E. Provide "PUSH TO TALK" button tactile symbol engraved signage and Braille adjacent to button mounted integral with car operating panels.
- F. The auto dial system shall be located in the auxiliary car operating panel. The speaker and unit shall be mounted on the backside of the perforated stainless steel plate cover.
- G. Each elevator shall have individual phone numbers.
- H. If the operator ends the call, the phone shall be able to redial immediately.

## **2.51 SEISMIC REQUIREMENTS**

- A. Meet the requirements of ASME A17.1 Section 8.4, Elevator Safety Requirements for Seismic Risk Zone 2 or greater and VA Seismic Design Manual H-18-8.
- B. Support and maintain hoisting machines, controllers in place to prevent any component from sliding, rotating, overturning, or jumping under conditions imposed by seismic forces not less than that required to produce an acceleration of gravity horizontally and 1/2 gravity vertically acting simultaneously. Design the total system to continue operation without interruption under specified seismic acceleration, as outlined in H-18-8.
- C. Provide hoisting machines mounted on vibration isolators with separate isolated seismic restraints.
- D. Controllers and supervisory panel shall be bolted to the floor, and provided with sway braces at the top. Secure all electrical components within the panels to the panel frame. Fit cabinet doors with positive locking latches.
- E. Provide two counterweight derailment sensing wires vertically on the car side of the counterweight the entire height of travel. The counterweight frame shall be equipped with four derailment rings. Provide counterweight displacement switch. In the event the switch is activated, the corresponding elevator shall stop immediately and then proceed in the direction away from the counterweight to the next floor at a speed not exceeding 0.76 m/s (150 FPM). Upon arrival at the next floor, the elevator shall shut down with its door open. An indicator pilot light shall illuminate when the counterweight derailment detector is activated. This pilot shall be fully identified and shall be located in the machine room indicator panel, or if no machine room indicator panel is specified, locate pilot light in a conspicuous place on the front of the elevator controller, not obstructed by controller door panels.
- F. Provide box in machine room for seismic switch to activate seismic operation, a minimum of one seismic switch per elevator or group of elevators.

## **PART 3 - EXECUTION**

### **3.1 SPACE CONDITIONS**

- A. Attention is called to existing overhead clearances, pit clearances, overall spaces available in hoistway and machine room and machine room environmental conditions in connection with completion of specified elevator work. Provide proper, satisfactory and code legal installation of equipment as a whole, including all construction, accessories, and devices in connection with elevator, mechanical and electrical work specified herein.
- B. Any construction changes or relocation of equipment, conduit, wiring, etc., required to accomplish the specified elevator installation must be arranged and obtained by the contractor, subject to the approval of the Contracting

officer or COR. Cost of such changes shall be included in the base bid and shall form a part of the contract.

### **3.2 ARRANGEMENT OF EQUIPMENT:**

- A. Clearance around new elevator, mechanical and electrical equipment shall comply with applicable provisions of NEC. Arrange new equipment so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same area.

### **3.3 WORKMANSHIP AND PROTECTION**

- A. All installations shall be made in a first class, neat and skillful manner by mechanics experienced in the trade involved. All details of the installation shall be mechanically and electrically correct. All materials and equipment shall be new and without imperfections.
- B. Patch any existing holes in hoistway walls to meet fire rating.
- C. Recesses, cutouts, slots, holes, patching, grouting, refinishing and the like to accommodate installation of equipment shall be included in the elevator contractor's work. All new holes in concrete shall be core drilled.
- D. No structural members shall be cut or altered. Work in place which is damaged or defaced shall be restored equal to original condition.
- E. Finished work shall be straight, level and plumb, with true, sharp surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. At final completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.
- F. Sleeves for all conduit and other small holes shall project two inches above concrete slabs.
- G. Where beams, slabs, or other building construction protrude more than four (4) inches into the hoistway, all top surfaces shall be leveled with 20 gauge steel at an angle of at least 75 degrees to the horizontal.
- H. Contractor shall provide and maintain adequate fire extinguishers on site and in the areas where welding or cutting is to occur.

**3.4 PRETESTS AND TESTS:** Pretest, as per specifications, the elevators and related equipment, in the presence of the COR for proper operation before requesting final inspection.

- A. Procedure outlined in the "Practice for Inspection of Elevators, Escalators and Moving Walks (Inspectors Manual)" ASME A17.2 shall apply.
  - 1. Final test shall be conducted in the presence of and witnessed by the Veterans Administration Consulting Support Office (003C5), Elevator Engineers or an ASME QEI-1 Certified Elevator Inspector.
  - 2. Government shall furnish electric power including necessary current for starting, testing and operating machinery of each elevator.
- B. If required by the Veterans Administration elevator engineer, inspection shall be conducted at other than normal working hours.
  - 1. Contractor shall furnish the following test instruments and materials on-site and at the designate time of inspection: properly marked testing weights, voltmeter, amp-meter, thermometers, stopwatch, direct reading tachometer and a series of "walkie-talkies".
  - 2. If during the inspection process, the Department of Veterans Affairs representatives determine the need, the following instruments should be available within a four-hour period: megohm meter, vibration meter, sound meter and a light meter.

- C. Inspection shall be made of workmanship and equipment furnished and installed for compliance with specification.
- D. Balance Tests: The percent of counterbalance (40%) shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counterbalance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached at no additional cost to the VA.
- E. Full Load Run Test: Elevators shall be tested for a period of one hour continuous run with full contract load in the car. During the test run, the car shall be stopped at all floors in both directions of travel for a standing period of not less than five nor more than 10 seconds per floor.
- F. Speed Test: The actual speed of the elevator shall be determined in both directions of travel with full contract load, balanced load, and no load in the elevator. Speed shall be determined by applying a tachometer to the car hoisting ropes and/or governor rope. The actual measured speed of the elevator with all loads in either direction shall be within five percent of specified rated speed.
  - 1. Full speed runs shall be quiet and free from vibration and sway. when cars are standing at the floor with doors open, they shall remain fully stopped with hoisting machine brake applied.
- G. Temperature Rise Test: The temperature rise of the hoisting motor and boosters shall be determined during the full load test run. Temperatures shall be measured by the use of thermometers inserted into the various windings. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees Centigrade above ambient temperature. Test shall be started only when all parts of equipment are within five degrees Centigrade of the ambient temperature at time of starting test. Other tests for heat runs on motors shall be as specified in the latest procedure of the Institute of Electrical and Electronic Engineers.
- H. Check amp reading with empty, balanced and full load. At full load, the amp reading shall not exceed the motor nameplate amperage.
- I. Car Leveling Test: Elevator car leveling devices shall be tested for accuracy of leveling at all floors with no load in car, balanced load in car and with contract load in car, in both directions of travel. Accuracy of floor leveling shall be within plus or minus 1/8 inch of level with any landing floor for which the stop has been initiated (with a definite range of distance in advance of the landing) regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 1/8 inch or level with the landing floor regardless of change in load.
- J. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in down direction with no load up to and including 125 percent of contract load in the car. Up travel not required.
- K. Insulation Resistance Test: The elevator's complete wiring system shall be free from short circuits and grounds and the insulation resistance of the system shall be determined by use of MEGGER, at the discretion of the Veterans Administration representative conducting the test.
- L. Safety Devices and Governor Tests: The safety devices and governor shall be tested as required by Rule 8.10.2 of the Code.
- M. If equipment fails, test requirements and re-inspection is required, the Contractor shall be responsible for costs of re-inspection, including salaries, transportation expenses, other expenses of the representatives of the COR.

N. Limit Stops:

1. The position of the car when stopped by each of the normal limit stops with contract load in the car shall be accurately measured. The car shall reach the terminal landings under the above condition.
  2. Final position of the elevator relative to the terminal landings shall be determined when the elevator has been stopped by the final limits. The lower limit stop shall be made with contract load in the elevator. Elevator shall be operated at contract speed for both tests. Normal limit stopping devices shall be inoperative for the tests.
- O. Oil Buffer Tests: These tests shall be conducted with operating device and limit stops inoperative and with contract load in the elevator for the car buffer and with no load in the elevator for the counterweight buffer. Preliminary test shall be made at the lowest (leveling) speed. Actual tests shall be conducted at contract speed. Buffers shall compress and return to the fully extended position without oil leakage.
- P. Setting of Car Door Contacts: The position of the car door at which the elevator may be started shall be measured. The distance from full closure shall not exceed that required by the Code. The test shall be made with the hoistway doors closed or the hoistway door contact inoperative.
- Q. Setting of Interlocks: The position of the hoistway door at which the elevator may be started shall be measured and shall not exceed the Code Requirements.
- R. Operating and Signal System: The elevator shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration. Stopping shall be without bumps or jars.
- S. Performance of the elevator dispatching system shall be witnessed and approved by the COR's representative.

**3.5 TEST RUN PERIOD**

- A. Once an elevator is temporarily accepted by the VA personnel, there will be a test run of the accepted elevator for up to one week before the next elevator is turned over to the Contractor.

**3.6 PAINTING AND FINISHING**

- A. Controllers and all other uncoated ferrous metal items shall be painted not less than one factory priming coat or approved equal.
- B. Upon completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster and other debris. All equipment, except that otherwise specified as to architectural finish, shall then be given two coats of paint of approved color, conforming to manufacturer's standard.
- C. No field painting of governors shall be permitted.
- D. Paint floor designation not less than four inches high on hoistway doors, fascias and/or walls as required by Rule 2.29.2 of the Code. The color of paint used shall contrast with the color of the surfaces to which it is applied.
- E. Elevator hoistway machines, controllers, starters, relay panels and selectors shall be identified by 4-inch high numbers located as directed. Governors, shunt trip circuit breakers, and cross heads of cars shall be identified by 4-inch high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled.

- F. Surface of door frames, door panels, interior cab surfaces, etc., that become damaged or marred during renovations shall be restored to original condition in a satisfactory manner before final acceptance of work.

### **3.7 INSTRUCTION OF PERSONNEL**

- A. Provide instructors to train VA personnel in operation of the equipment and accessories installed under this contract, for a period of not less than one eight hour work day. Instruction shall commence after completion of all work and at such time as directed by the COR. Training shall be conducted during the hours of 7:30 AM through 4 PM.
- B. In addition to oral instruction, written instructions in triplicate relative to car, adjustment and operation of all equipment and accessories shall be furnished and delivered to the COR in independently bound folders. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electric apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts lists with descriptive literature and identification and diagrammatic cuts of equipment and parts.
- C. Provide any supplementary instruction for adjustment and care of new equipment that may become necessary because of changes, modification and/or replacement of equipment or operation under requirements of paragraph entitled "GUARANTEE".

### **3.8 INSPECTIONS AND MAINTENANCE SERVICE**

- A. Furnish complete maintenance and inspection service on entire elevator systems. The modernized elevator systems shall be guaranteed for a period of one year beginning with the completion and acceptance of the last elevator installation by COR. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices employed supervised by the company that is providing guaranteed period of service on the elevator equipment specified herein.
- B. This contract will cover full maintenance, which includes emergency call back service, inspections and preventive maintenance of each of the elevators listed in the Schedule of Elevator. The Contractor shall be required to perform WEEKLY inspections during the maintenance period. During the inspection visit, the Contractor shall clean, adjust and lubricate the equipment. Determine the nature and extent of any trouble required to restore the elevators to satisfactory service, and if conditions warrant, furnish and install parts.
- C. When and as required, motors, controllers, relay panels, selectors, leveling devices, operating devices, switches, in car and in hoistways, hoistway door and car door or gate operating device, interlock contacts, guide shoes, guide rails in hoistway, and car door sills, hangers for doors, car doors or gates, signal system, car safety device, governors, tension and sheaves in pit shall be cleaned, lubricated and adjusted. Hoist motor brushes shall be checked for wear at least every two weeks. Accumulated carbon shall be removed from the commutators, brush rigs and windings at the same time.
- D. Furnish all lubricant, cleaning materials and parts required.
- E. Cleaning Services: Guide rails, overhead sheaves and beams, counterweight frames, bottom of platforms and machine rooms floors shall be brushed cleaned at least once every four month. Car tops shall be cleaned monthly. All accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Necessary cleaning supplies, vacuum cleaner, shall be furnished by the Contractor.
- F. Adjustment Services: All hoistway ropes shall be examined and the tension shall be adjusted whenever necessary to insure maintenance of adequate safety factors.

- G. Materials to be furnished: The Contractor shall furnish all lubricants, cleaning supplies and tools necessary to perform the work described above. All lubricants shall be as recommended by the manufacturer of the equipment.
- H. This guarantee service shall not include the performance of any work required as a result of improper use, accidents, or negligence for which the contractor is not directly responsible.
- I. Provide 24 hour emergency call-back service which shall consist of promptly responding to calls within one hour for "TRAP CALLS" and two hours for emergency service after receiving call, should a shutdown or emergency trouble develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons in and about the elevator.
- J. Service and emergency personnel shall report to the COR or his authorized representative upon arrival at the medical center and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the COR.
- K. The contractor shall maintain a log in the Elevator Machine Room. The log shall list the date and time of all weekly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed or parts replaced.
- L. After arriving on site to start the project, the elevators contractor shall start to maintain all elevators on this contract and continue during renovation period. This will be at no billable cost to the VAMC. This maintenance period shall be included in the renovation bid. This is separate from the one year maintenance contract which starts with the completion of project.

END SECTION 14 26 26



**SECTION 14 26 26**  
**ELEVATORS S-1, S-2, S-3, S-4**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section of the specification is intended to cover the complete furnishing of all labor, materials, engineering and components on elevators located in Building 500. The elevators included in the specification are existing service elevators S-1, S-2, S-3, S-4 (one group).

**1.2 SCOPE OF WORK**

A. All elevators; Replace existing overhead DC gearless traction machines with overhead AC gearless machines, secondary sheaves, car top and counterweight sheaves, hoist cables, governors, hoistway doors and door equipment, compensation cables and sheaves. Reuse existing machine beams, main and counterweight rails, buffers, counterweights, entrance frames, sills, hanger supports, strut angles, fascia plates, platforms, and cabs.

B. A site visit required for all bidders.

**1.3 ELEVATOR SERVICE**

A. One elevator may be removed from service at any one time, from this group, unless prior arrangement is made with Contracting Officer and/or Contracting Officer's Representative (COR) to permit performance of work. All work on elevator vacated shall be completed, put into operation, and temporarily accepted before work on any other elevator can start. Prior to each temporary acceptance, contractors shall complete all pertinent safety tests and inspections. Final inspection and tests shall be given only when all work on all elevators has been completed. Final acceptance shall be given only upon successful completion of final inspection and tests. Premises shall be occupied during performance of work, but Contractor shall have uninterrupted use of scheduled elevator vacated for completion of work.

B. When more than one elevator must be removed from service for cross connection of hall pushbuttons or interface of dispatching controls, contractor shall perform this work after 7:00 PM and before 6:30 AM. The Contracting Officer and/or Contracting Officer's Representative (COR) shall be notified fourteen (14) calendar days in advance of this work.

**1.4 WORK SCHEDULE**

A. Before work is started, submit prepared work schedule for approval and arrange with COR sequence of procedure, means of access to premises, space for storage, use of approaches, corridors, stairways and elevators, location of temporary partitions, etc. The COR must be notified fourteen (14) calendar days, in writing, in advance of starting work on elevator. No work may begin on any elevator until all materials for that elevator has been delivered to the site and verified by the Contracting Officer and/or Contracting Officer's Representative. The VA does not accept deliveries of equipment. The phasing of work on the elevators shall be coordinated with the Contracting Officer and/or the Contracting Officer's Representative.

**1.5 SAFETY PRECAUTIONS**

A. Building will be occupied during execution of work. Work shall be conducted in a manner to afford maximum protection of building, facilities, patients, employees and the public and to prevent unreasonable delay or interference with normal functioning of hospital activities.

B. Where adjacent car is in operation, isolate elevators from each other by suitable barriers (removable screen) between them, extending from pit floor to bottom of secondary slab at top of hoistway, while work is in progress. Remove partition when work is completed.

C. Provide fire extinguishers so that they shall be readily available at all times at work site.

D. It shall be the obligation of the Contractor to maintain a free and clear passageway in each elevator lobby. Parts, tools, etc. shall be kept within the confines of entrance partitions. Trash and debris shall be removed daily.

#### **1.6 REMOVED MATERIALS AND EQUIPMENT**

A. Materials that are required to be removed and not specified to be reused or retained under contract shall be removed weekly from the site at the expense of the Contractor. Contractor shall receive title to all materials and equipment required to be removed and not specified to be reused or retained, as of date of withdrawal of material from service by Contractor to complete required and scheduled work. Government does not warrant condition of said material to which Contractor shall obtain title, nor shall Government be liable for damage before or after title passes to Contractor.

#### **1.7 APPLICABLE PUBLICATIONS**

A. The following specifications and standards of the issues listed below (including the amendments, addenda, and errata designated) form a part of this specification to the extent indicated by the reference thereto. In text, such specifications and standards are referred to by basic number or designation only.

B. Federal Specifications (Fed. Spec.):

- J-C-30B(1).....Cable and Wire: Electrical (Power, Fixed Installation).
- W-C-596A(2).....Connector, Plug, Electrical; Connector, Receptacle, Electrical.
- W-F-406E.....Fittings for Cable, Power, Electrical & Conduit, Metal, Flexible.
- W-F-408E.....Fittings for Conduit, Metal, Rigid, (Thick-Wall & Thin Wall (EMT) Type).
- ABSI/UL 797.....Conduit, Metal, Rigid: Electrical, Thin-wall Steel Type (Electrical Metallic Tubing): Straight Lengths, Elbows & Bends.
- WW-C-566C.....Conduit, Metal, Rigid: and Coupling, Elbow, and Nipple, Electrical Conduit: Zinc-coated.
- 1. GAUGES: Sheet and Plate: U.S. Standard Wire: American wire Gauge (AWG).
- 2. D1.1-72: American Welding Society (AWS).
- 3. IEEE: Institute of Electrical and Electronic Engineers.
- 4. NEMA: National Electric Manufacturers Association.
- 5. NFPA No. 252: Fire Tests of Door Assemblies.

C. The following standards and codes of the issues listed below (including the latest amendments, addenda, and errata) form a part of this specification:

- 1. A17.1: 2010 American National Standards Institute (ANSI/ASME) Standards: Safety Code for Elevators and Escalators. In text, publication will be referred to as the Code.

2. A17.2: 2010 American National Standards Institute (ANSI) Standards: Practice for the Inspection of Elevators, Escalators and Moving Walks, Inspector's Manual.
3. NFPA No. 70: (Latest version) National Electrical Code. In text, the Code will be referred to as NEC.
4. Uniform Federal Accessibility Standards & VA Supplement to uniform Federal Accessibility Standards, 1988.
5. Americans with Disabilities Act, Latest edition with supplements.

#### **1.8 QUALIFICATIONS:**

A. Approval by the Contracting Officer is required of products or services of proposed manufacturer, suppliers and installers and will be contingent upon submission by Contractor of a certificate stating the following:

1. Elevator contractor is currently and regularly engaged in modernization of elevator equipment as one of his principal products.
2. Installer has technical qualifications of at least five years of successful experience, trained supervisory and installation personnel, and facilities to install and/or modernize elevator equipment specified herein.
3. The installers shall be Certified Elevator Mechanics with qualifications of at least five years of successful experience and Apprentices actively pursuing certified mechanic status. Certificates shall be submitted for all workers in this capacity.
4. Proposed Contractor shall submit a list of two or more prior hospital installations where all the elevator equipment he proposes to furnish on this project has performed satisfactorily together under conditions of normal use. The list shall include projects that have been in operation for a period of not less than two years proceeding the date of these specifications; include the names and addresses of the Medical Center and the names of the Medical Center Administrators.

B. Approval of elevator contractor's maintenance/service will be contingent upon being able to render services within two hours of receipt of notification. Elevator contractor shall submit the names and addresses of his authorized branch or service department which will render service to this installation, together with certification that the quantity and quality of replacement parts stock on hand is sufficient to guarantee continued operation of the elevator installation.

C. Elevator equipment shall operate with maximum noise of 80 decibels. They shall be sufficiently quiet so that they will not create objectionable noises in the car and hoistway, or create a disturbance to occupants on the various floors adjacent to the hoistway and machine room. The COR reserves the right to reject equipment and installations which are, in their opinion, not sufficiently quiet under all operating conditions.

#### **1.9 WIRING DIAGRAMS**

A. Provide three complete sets of field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway, as well as the machine room. Install one set framed under plastic and mounted in the elevator machine room as directed by the COR. In the event field modifications are found necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the COR within 30 days of final acceptance.

B. 3 sets of the following information relating to the specific type of microprocessor controls installed on this project shall be provided:

1. Owner's information manual, containing general data on major components maintenance and adjustment.
2. System logic description.
3. Complete wiring diagrams needed for field troubleshooting, adjustment, repair and/or replacement of components. Diagrams shall be base diagrams, containing all changes and additions made to the equipment during the design and construction period.
4. Changes made during the warranty period shall be noted on the drawings in adequate time to have the finalized drawings reproduced for mounting in the machine room no later than six months prior to the expiration of the warranty period.

#### **1.10 ADDITIONAL EQUIPMENT**

A. Additional equipment required to operate specified equipment manufactured and contemplated for this installation shall be furnished and installed. The cost of such equipment shall be included in the base bid.

#### **1.11 SAMPLES AND DESCRIPTIVE DATA**

A. Materials shall be submitted singularly and separately and apart from materials specified under other Sections and shall be marked 'SUBMITTED UNDER SECTION 14 26 26". In accordance with provisions of section 01340, SAMPLES AND SHOP DRAWINGS, all submitted drawings and related elevator material shall be forwarded to the VAMC West Los Angeles, Engineering Service (138), P.O. BOX 69004, Los Angeles, CA., 90073, Attention Francisco Silva, in order to perform a concurrent review.

B. Before executing any work, furnish information sufficient to evidence full compliance with contract requirements on proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, rating) and corresponding specification references (Federal or project specification number and paragraph).

C. Name of manufacturer, type or style designation and applicable data of the following equipment shall be shown on the elevator submittals:

1. Controllers; VVVF AC
2. Group Supervisory System Controller
3. Selector/Leveling unit
4. VVVF, AC Drive, gearless motors.
5. Electric door operator; H.P. rating and R.P.M. of motor
6. Governors
7. Infrared door curtain units.
8. Motion Control (MCI) "iView" Monitor computer system.
9. Car top fans.
10. Compensation chains.
11. Secondary, car top and counterweight sheaves.
12. Car top run button.
13. Audio voice with list of messages.
14. Auto dial phone system.

D. Shop Drawings:

1. Cuts or drawings and description of power door operator.

2. Cuts or drawings showing details of all signal and car equipment fixtures.
3. Furnish certificates as required under paragraph "Qualifications"
4. Car operating panels.
5. Hoistway doors, tracks, hangers and rollers, closers, pick up and release arms and rollers, and interlocks.
6. Car doors.
7. Cabs and cab ceilings.
8. Replacement of door jambs, ground floor S-2, 3, 4 and first floor S-1,2,3.
8. Re-skinning of hoistway door jamb entrances.
9. Re-skin front return panels and car door headers.
10. Re-skinning of cabs with new textured stainless steel

#### **1.12 PERFORMANCE STANDARDS**

- A. The elevators shall be capable of meeting the highest standards of the industry and specifically the following.
- B. Contract speed shall mean speed in the UP direction with full capacity load in the car. Speed variation under any load condition, regardless of direction, shall be no more than 5 percent.
- C. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per second and the maximum acceleration and retardation shall not exceed 0.2G per second.
- D. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration and deceleration. Stopping shall be without bumps or jars.
- E. Full speed running shall be quiet and free from vibration and swaying. When cars are standing at the floor with doors open, they shall remain firmly stopped and shall not rock side to side.
- F. Rope stretch recovery shall be provided to re-level cars at a floor, if the ropes slightly stretch.
- G. Cars shall not move from side to side during the process of opening and closing the doors.
- H. Elevator control systems shall be capable of starting the car without noticeable "roll-back" of hoistway machine sheave, regardless of load condition in car, location of car, or direction of travel.

#### **1.13 TOLERANCES**

- A. Floor Accuracy:

1. Leveling control systems, 1/8 inch above or below the floor.

#### **1.14 GUARANTEE:**

- A. The modernized elevator systems shall be guaranteed beginning with the completion and final acceptance of the last elevator installation by the COR. It shall be subject to terms of "GUARANTEE" articles of Section GENERAL CONDITIONS (except for length of guarantee). Upon receipt of notice from the Government of failure of any portion of materials and workmanship furnished, affected part or parts shall be replaced promptly with new parts by and at the expense of the contractor. The guarantee period shall concur with the length of the maintenance contract (1 year).

B. No device will be acceptable that will not give perfect satisfaction without excessive maintenance and attention. If it becomes evident during the guarantee period that the device is not functioning properly or in accordance with specification requirements, or, if in the opinion of the COR, excessive maintenance and attention must be employed to keep device operating, device shall be installed as part of work until satisfactory operation of installation is obtained. Period of guarantee shall start anew from date of completion of new installation performed in accordance with foregoing requirements.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish (150 grit) on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and all surfaces shall be perfectly smooth and without waves. During renovation, all stainless steel surfaces shall be protected by suitable material.

### **2.2 MANUFACTURED PRODUCTS**

A. Materials, devices and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. Items not meeting this requirement, but which otherwise meet technical specifications and the merits of which can be established through reliable test reports or physical examination of representative samples, will be considered.

B. When two or more units of same class of materials, devices or equipment are required, these units shall be products of one manufacturer.

C. Manufactures of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit.

1. All components of an assembled unit shall be products of the same manufacturer.
2. Parts which are alike shall be the product of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for the intended service.

D. If the elevator equipment to be installed is not known to the COR, the Elevator Contractor shall submit drawings in triplicate for approval, showing all details.

E. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS D1.1 to perform type of work required. VAMC shall require welding certificates be submitted for all workers employed in this capacity. A welding or burning permit is required and shall be obtained from the VA COR. Request permit one day in advance.

F. Motor nameplates shall state rated horsepower, speed, volts, amperes and other characteristics required by NEMA Standards and shall be securely attached to the item of equipment in a conspicuous location.

G. The elevator equipment, including controllers, selectors, door operators, leveling units, and supervisory system, each shall be the product of one manufacturer of established reputation, except that any of the above items may be the products, either wholly or in part, of any manufacturer of established reputation provided such items are capably engineered and produced under coordinated specifications to ensure a first class, safe and smooth operating system.

H. Were key operating switches are furnished in conjunction with any component of this elevator installation; furnish 4 keys for each individual switch or lock. All new keys to match elevator keys on elevators located in Building 258. Do not provide "barrel type" keys. Fire service key switch shall be provided to match Building 258. Attach each key to a tag bearing a stamped or etched legend identifying its purpose. Engrave tags and imprint "Property of U.S. Government" on the reverse side.

### 2.3 CAPACITY, SPEED, TRAVEL, ETC.

A. Each elevator shall have the capacity to lift a live load (exclusive of the weight of the car and ropes) at the speed in feet per minute as specified in the following schedule:

Elev. No	Rated Load Lbs.	Speed FPM	Rated Travel Ft.	Total Floors Served	Stops	No. of Openings
S-1	5000	500	140' 8"	G,1-6	14	14
Has interstitial floors G, 1-6						
S-2, S-3 S-4	5000	500	131' 8"	G,1-6	7	7

B. Total travel is approximate and must be verified in the field by the Contractor.

C. Rated speed shall mean speed in either direction of travel with rated capacity load in car. Actual speed, under any load condition shall not vary more than five percent of rated speed.

### 2.4 POWER SUPPLY

A. Power for emergency operation of elevators specified will be available from emergency power feeders and transfer switch.

B. Reuse existing shunt trip circuit breakers located in elevator machine room.

C. See Paragraph 2.11 Auxiliary power operation.

### 2.5 GROUNDING

A. Equipment grounding shall be provided. Ground conductors, supports, controller enclosure, motors, platform and car frames and other noncurrent conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, insulated and sized as required by NEC. Bond the grounding wires to each pull boxes, junction boxes, cabinets and other enclosures through which the wires pass.

### 2.6 CONDUIT, WIREWAY (DUCT):

A. May reuse existing conduit and wireway duct located in hoistway and machine room that conforms to NEC. New conduit and duct shall comply with the following paragraphs.

B. Unless otherwise specified or approved, install electrical conductors, except traveling cable connections to the car, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Where permitted by NEC, 1/2-inch trade size conduits and EMT may be used only for tap connections to interlocks, emergency exits and leveling units. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. No rigid

conduit or electrical metallic tubing shall be smaller than 3/4-inch electrical trade size. An auxiliary gutter may be used between controller, starter, and similar apparatus in the elevator machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 3/8 inch electrical trade size may be used, not exceeding 18 inches in length, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC. Flexible heavy-duty service cord, type S.O., may be used between fixed car wiring and switches on car doors for infrared curtain units.

C. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushing. Install a steel lock nut under the bushing if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.

D. Conduit and EMT fittings and connectors using set screws or indentations as a means of attachment shall not be used.

E. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits. Certain existing conduits and ducts may be reused if they are code conforming and prior agreement is received from the COR.

## **2.7 CONDUCTORS: PROVIDE NEW**

A. Unless otherwise specified, conductors, exclusive of traveling cables, shall be stranded or solid coated annealed copper in accordance with Fed. Spec. J-C-30 for either type RHW or THW. Where 16 and 18 AWG are permitted by NEC, either single conductor cable in accordance with Fed. Spec. J-C-580 for type TF or multiconductor cable may be used, provided the insulation of single conductor cable may be, and outer jacket of multiconductor cable is flame retardant and moisture resistant. Multiconductor cable shall have color coding or other suitable identification for each conductor. Conductors for control board wiring, including wiring between main circuit resistors and control boards, shall be in accordance with NEC. No joints or splices will be permitted in wiring, except as outlets. Tap connectors may be used in wireways, provided they meet all UL requirements.

B. All wiring must test free from short circuits or grounds. Insulation resistance between individual external conductors and between conductors and ground, shall be not less than one megohm.

C. Where size of conductors is not given, capacity shall be such that maximum current shall not exceed limits prescribed by NEC.

D. Terminal connections for all conductors used for external wiring between various items of elevator equipment shall be solderless pressure wire connectors in accordance with Fed. Spec. W-S-Glo. The contractor may at his option make these terminal connections on No. 10 or small conductors with approved terminal eyelets set on the conductor with a special setting tool or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

E. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits. Certain existing conduits and ducts may be reused if they are code conforming and prior agreement is received from the COR.

## **2.8 TRAVELING CABLES: PROVIDE NEW**

A. All conductors to the car shall consist of flexible traveling cables conforming with the requirements of NEC. Traveling cables shall run from top of the car directly to controller.



B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than four spare conductors in each traveling cable.

C. Provide shielded coaxial conductors for the auto dial system within the traveling cable. Add 5 pair shielded wires for possible future card reader, 2RG/6U coaxial CCTV cables and 2 pair 14 gauge wire for CCTV power as needed.

D. If, due to sway or change in relative position of traveling cables, complete freedom from contact with the hoistway or elevator construction cannot be obtained, shields or pads shall be provided on the elevator of hoistway structure wherever necessary to prevent damage to the traveling cables.

E. Car lighting circuits shall be connected to the auxiliary/emergency power panel.

**2.9 CONTROLLERS, STARTERS, RELAY PANELS, SUPERVISORY PANELS AND SELECTORS:  
EXISTING TO BE REMOVED**

A. All controllers required for the control, dispatching, signals and door operations of the system shall be in accordance with the requirements of this paragraph.

B. All controller assemblies shall provide efficient, smooth and practically stepless acceleration and deceleration of the elevator hoisting machine, automatically and independently of the load in the car. The panel material shall be self-extinguishing, having a flame resistance that meet the requirements of either flammability test method 2021 or 2023, or Federal Test Method Standard No. 406.

C. All switches, relays and other components shall be mounted on the front of controller, starter, relay and selector panels. All wiring connections for controller components, resistors in excess of 30-watt capacity and transformers shall be mounted within enclosure. All controller wiring shall be neatly formed, laced and securely fastened in place.

D. If swing panel construction is used for any controller components, details shall be submitted for approval.

E. Wiring of the various external control and operating circuits shall be brought to a terminal board in the controller from where it shall continue to the various switches, solenoids and other devices on the panel. Connections of wires to terminals from external circuits shall be made with metal eyelets, solderless lugs or similar connectors. Starting and accelerating resistance shall be constructed of resistance wire or cast iron grids insulated with mica or other approved material and mounted to give constant pressure at all temperatures. If wire resistance is used, the material shall be capable of withstanding frequent heating and cooling cycles without excessive oxidation or crystallization and shall not be affected by atmospheric conditions. Resistance in connections with solenoids, etc., shall be wire, wound on noncombustible forms of insulating material and mounted so as to be readily renewable.

F. Equipment shall be provided to protect the driving motor against overload and single phasing in all three (3) phases of the delta connection, protect the control equipment against overload and phase reversal.

G. Where time delay relays are used in the circuits, they shall be of an acceptable design that is reliable and consistent, such as condenser timing or electronic timing circuits. No dash pot time relays shall be used.

H. Each device on all panels shall be properly identified by name, letter or standard symbol which shall be neatly stencil painted (or otherwise marked), in an indelible and legible manner, on device or panel. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controllers, selectors and relay panels shall be neatly formed, laced and identified.

## 2.10 MICROPROCESSOR CONTROL SYSTEM

- A. Provide Motion Control elevator controller MCE i Control AC microprocessor based system with absolute position/speed feedback encoded tape to control the hoisting machine and signal functions in accordance with these specifications. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval. All controller systems shall be non-proprietary and no special tool, including a hand held testing tool shall be necessary for adjustments or maintenance. The controller vendor shall be able to provide immediate tech support and be able to overnight mail any parts necessary for maintenance.
- B. All controller assemblies shall provide efficient, smooth, stepless acceleration and deceleration of the elevator hoisting machine, automatically and irrespective of the load in the car. All control equipment shall be enclosed in a metal cabinet with lockable, hinged door(s) and shall be provided with a means of ventilation. All non-conducting metal parts in the machine room shall be grounded in accordance with NEC. Cabinet shall be securely attached to the building structure.
- C. Circuit boards for the control of each elevator system, including dispatching, signals, door operation and special operation, shall be installed in a NEMA, Type 1, General Purpose Enclosure. Circuit boards shall be moisture-resistant, be non-corrosive, be nonconductive, be fabricated of noncombustible material and be of adequate thickness to support the components mounted thereon.
- D. Modules shall be the type that plug into pre-wired mounting racks. Field wiring or alteration shall not be necessary in order to replace defective modules.
- E. Each device, module and fuse (with ampere rating) shall be identified by name, letter or standard symbol in an approved indelible and legible manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams.
- F. The electrical connections between the printed circuit boards (modules) and the circuit connectors incorporated in the mounting racks shall be made through individual tabs which shall be an integral part of each module. The tabs shall be nickel-gold plated (or of other approved metal or equal electrical characteristics). Modules shall be keyed or notched so as to prevent insertion of the modules in the inverted position.
- G. Light emitting diodes (LEDS) shall be for visual monitoring of individual modules.
- H. Components shall have interlocking circuits to assure fail-safe operation and to prevent unwarranted elevator movement should any component fail to function properly.
- I. Method of wire wrapping for point to point with connections on the mounting racks shall be submitted for approval.
- J. Modules shall be of the type that plug into pre-wired mounting racks. Field wiring or alternation must not be required in order to replace defective modules.
- K. Field wiring changes required during construction shall be made only to the mounting rack connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules, they shall be returned to the factory where such design changes shall be made and module design records changes so that correct replacement units shall be available.
- L. Module boards shall be fabricated from nonconductive, non-corrosive material and shall be of sufficient strength so as to support all components mounted thereon without warping. Mounting racks shall be spaced sufficiently apart to prevent accidental contact between individual modules.

M. All logic symbols and circuitry designations shall be in accordance with ASME Standards.

N. Solid state components shall be designed to operate within a temperature range of 30 degrees F to 110 degrees F. No temperature controller or air conditioned rooms shall be required for proper operation of solid state components.

O. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce through serrated washers shall not be acceptable.

#### **2.11 AUXILIARY POWER OPERATION; REUSE EXISTING**

A. The control system for elevators S-1 through S-4 (one group) shall include provisions for operation on auxiliary power upon failure of the normal power supply.

B. Auxiliary power supply, including its starting means and a transfer switch for transfer of power supply from normal to auxiliary is existing.

C. Auxiliary equipment on elevator controllers, provide new wiring between associated elevator controllers.

D. Upon loss of normal power supply, there shall be a delay before transferring to auxiliary power. When returning to normal power, there shall be a time delay when switching over from auxiliary to normal power.

E. Upon return of normal power, an adjustable timed circuit shall be activated which will cause all cars to remain at the floor, if already there or stop if in flight. Actual transfer of power from auxiliary power to normal building power shall take place after car is stopped.

#### **2.12 VVVF MOTOR CONTROL WITH REGENERATIVE DRIVE:**

A. Solid State Motor Control:

1. Elevator control shall be affected by means of a compact solid state motor control unit for each elevator with electrical characteristics to suit the power supply. The system shall consist of the necessary three phase, full-wave bridge rectifiers and be fully regenerative.

2. Solid state motor control unit shall operate with high efficiency and low power consumption, have sufficient capacity to handle peak currents typical of elevator service and contain a balanced, coordinated fault protection system which shall accomplish not less than the following:

- a. Protect the complete power circuit and specifically the power semi-conductors from failure under short circuit (bolted fault) conditions.
- b. Protect against limited faults arising from partial grounds, partial shorts in the motor armature or in the power unit itself.
- c. Protect the drive motor against sustained overloads. A solid state overload circuit shall be used.
- d. Protect motor and power unit against instantaneous peak overload.
- e. Provide semi-conductor transient protection.
- f. Provide phase sequence protection to insure incoming line is phased properly.
- g. Removable printed circuit boards shall be provided for the VVVF control, designed tabs so boards cannot be reversed.

#### **2.13 GEARLESS TRACTION AC HOIST MACHINE**

A. Provide new AC gearless traction machines that meet the requirements of ASME A17.1.

1. Gearless traction machine with AC motor, two individual brakes, (2:1 roping) drive sheave, and secondary sheave mounted in proper alignment on an isolated bedplate.
2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
3. Armature must be electrically balanced and together with motor coupling and brake, mechanically balanced.
4. It shall be possible to adjust the rate of acceleration and deceleration after installation is made. The final adjustment shall not produce any objectionable physiological effects on the passengers.
5. The structural design of the motor shall insure perfect alignment of bearings. The rotating elements shall be dynamically balanced to minimize vibration.
6. Hoist machine shaft shall be supported by two bearings mounted on a bedplate or integral with machine frame. Shaft shall be of forged steel or close grain electric furnace cast steel.
7. Drive sheaves shall be free from cracks, sand holes, and other imperfections that would tend to injure the cables. Sheave shall be turned smooth and true with cable grooves of proper design to insure maximum traction and maximum life of the cables.
8. Hoist machine brake shall have the capacity to hold the elevator with 125 percent of rated load. Arrange brake circuits so that no current will be applied to the brake coil prior to the establishment of the hoistway door interlock circuit.

#### **2.14 SHEAVES**

- A. Provide new secondary, car top and counterweight sheaves that are compatible with new hoist ropes and meet the requirements of the machine and wire rope manufacturers.
- B. Provide cable guards that will prevent cables from jumping off sheaves during testing, normal operation and cover pinch points.

#### **2.15 MACHINE BEAMS - RETAIN EXISTING**

#### **2.16 CAR AND COUNTERWEIGHT GUIDE RAILS**

- A. Retain existing car and counterweight guide rails and brackets.
- B. Thoroughly clean all guide rails of grease, oil, rust and other foreign substances. File and remove all rough edges and surfaces and tighten bracket bolts and guide clips for smooth and quiet operation of car and counterweight.
- C. Provide any required rail backing and/or intermediate tie brackets to comply with ASME Code for bracket spacing for both car and counterweight rails.

#### **2.17 ROLLER GUIDES FOR CAR AND COUNTERWEIGHT: NEW**

- A. Provide car and counterweight with new roller guides.
- B. Each guide shall be an approved type consisting of not less than 6 wheels for car and 3 wheels for counterweight, each with durable, resilient oil resistant material with tires rotating on ball bearings sealed in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. The wheels shall be of ample diameter and shall run on three machined finished dry rail surfaces. Secure the roller guides on each side of the car and counterweight frame. All mounting bolts shall be fitted with nuts, flat washers, split lock washers and if required, beveled washers.

C. Provide sheet metal guards to protect wheels on top of car and counterweights.

**2.18 CAR AND COUNTERWEIGHT BUFFERS:**

A. Reuse existing main and counterweight pit channels and buffers. Reuse existing buffer switches with new wiring on all buffers.

**2.19 COUNTERWEIGHTS: EXISTING TO BE RETAINED.**

A. The counterweights shall be cleaned and all missing or damaged bolts, tie rods, frames, and members shall be replaced.

B. Sub weights shall be added to or removed from the counterweights frame to provide a counterbalance equal to the weight of the complete car and approximately 40 percent of the rated capacity. New sub weights shall be sectional cast iron, flame cut hot rolled steel or cast lead. Test for this balance shall be witnessed in the presence of and as directed by the COR.

**2.20 HOISTING ROPES;**

A. Provide new hoist cables.

B. Ropes to meet ASME A17.1 Elevator Code.

C. Replace existing shackles with wedge type shackles.

D. Provide elevator with the required number and size of ropes to insure adequate traction for the range of loads with a factor of safety not less than required by ASME A17.1 Code. Hoisting ropes shall have a special traction steel, preformed, with a diameter to match hoist machine.

E. Attach a corrosion resistant metal tag to one of the hoisting rope fastening. Tag shall bear data as required by ASME A17.1 Code.

**2.21 GOVERNOR ROPE: NEW**

A. New governor ropes shall be 6 X 19 or 8 X 19 wire rope, iron or traction steel, undercoated with fiber core.

B. Under normal operation, rope shall run free and clear of governor jaws, rope guards and other stationary parts.

C. Governor rope tag shall be securely attached to governor rope releasing carrier. Data tag shall be corrosion-resistant metal and shall bear data as required by the Code.

**2.22 COMPENSATION:**

A. Remove existing compensation cables, sheaves and switches.

B. Replace with new "whisper flex" encapsulated chains.

**2.23 SAFETY DEVICE: REUSE EXISTING**

A. Clean safety devices, re-adjust to comply with current requirements of the code.

B. A permanently attached metal data tag shall be applied to each safety device bearing the information required by ASME A17.1.

C. May reuse existing safety operated switch (SOS).

D. Field test of car safety and governor shall be as specified in the Section entitled "TESTS" of these specifications.

**2.24 OVERSPEED GOVERNORS:**

A. Replace all existing governors with new centrifugal type governors. Provide new over speed and speed reducing switches.

B. Over speed and speed reducing switches to work as required by ASME A17.1 code. Switches shall operate in both directions.

C. The governor rope clamping device shall be adjusted so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the safety. The grip jaws shall be of such shape and length that pull-through action of the governor rope, as required by Code, will result in a minimum amount of rope abrasion.

D. Install all new governor pit sheaves and weights.

E. No field painting of governor parts shall be permitted.

F. Move location of governors from secondary area to machine room.

**2.25 NORMAL AND FINAL TERMINAL STOPPING DEVICES: PROVIDE NEW:**

A. Normal and final terminal stopping devices shall conform with the Code.

B. Mount normal stopping switch on car or in hoistway to slow speed of car and bring it to an automatic stop level with the terminal landings.

1. Switch shall function with any load up to and including 125 percent of rated elevator capacity at any speed obtained in normal operation.

2. Switch, when opened, shall permit operation of car in reverse direction.

3. No normal stopping device, other than one mounted on car and activated by cams in hoistway, or mounted in hoistway and activated by cams on car, shall be permitted.

C. Mount final terminal stopping switches in the hoistway.

1. Switches shall be positively opened by car should the car travel beyond the normal stopping switches.

2. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake and prevent operation of car in either direction.

**2.26 WORKMAN'S LIGHTS AND OUTLETS: NEW**

A. Provide lamps with wire guards on top of each elevator car and beneath the platform.

**2.27 TOP-OF-THE CAR OPERATING DEVICE: NEW**

A. The device shall conform to ASME A17.1, Section 2.26.

B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 1/4-inch letters.

C. Movement of the elevator shall be accomplished by the continuous pressure on a direction button and a safety button.

D. Provide an emergency stop toggle switch.

E. Provide permanent identification for the operation of all components in the device.

F. The device shall be permanently attached to the elevator cross head on the side of the elevator nearest to the hoistway doors used for accessing the top of the car.

**2.28 CAR LEVELING DEVICE: PROVIDE NEW:**

A. Car shall be equipped with a two-way leveling device to automatically bring the car to within 1/8 inch of exact level with landing for which a stop is initiated regardless of load in car or direction of travel.

B. Car shall, at all times, level into the floor and shall not stop above or below the floor and level back.

C. The automatic leveling device shall, within its zone, be entirely independent of the operating device and if the car stops short or travels beyond the floor, the leveling device shall automatically correct this condition and maintain the car within plus or minus 1/8 inch of level with the floor landing regardless of the load carried and its stretching effect on the cables during loading and unloading.

D. A car leveling device functioning through the medium of vacuum tubes or photoelectric tubes is not acceptable. Approved permanent magnet, electromagnetic, encoder, or selector type leveling is required.

#### **2.29 EMERGENCY STOP SWITCHES: NEW**

A. Emergency stop switches shall conform to the Code.

B. Each stop switch shall be red in color and shall have its "identity" and "STOP" and "RUN" positions legibly and indelibly identified.

C. Provide new pit switches for all elevators. Elevators have walk in pits. Locate pit switch 4 feet above lowest floor landing by walk in pit door and on pit wall in front of each elevator.

#### **2.30 OPERATING DEVICE FACEPLATES; NEW**

A. Fabricate faceplates for all elevator operating and signal devices from not less than 1/8-inch thick flat stainless steel with all edges beveled at least 15 degrees. Install all faceplates flush with surface upon which they are mounted.

B. The centerline of the landing push-button fixtures for service elevators shall be 42 inches centerline. The new push button plate shall be at least 5 inches wide by 12 inches high.

C. Fasten all car and corridor operating device and signal device faceplates with non-corrosive white metal spanner head or bristol head tamperproof screws.

D. Elevator corridor call station pictograph shall be engraved in the faceplate at all floors.

E. Design car and corridor pushbutton faceplates so that pressure on pushbuttons shall be independent of pressure on pushbutton contacts.

F. Engraved legends in faceplates shall have lettering 1/4-inch high filled with black paint.

G. Provide braille on pushbutton faceplates. Surfaced mounted plates are not acceptable.

H. Disconnect and remove existing first floor auxiliary power box. Cover box hole with a stainless steel plate.

#### **2.31 OPERATING DEVICES AT HOISTWAY LANDINGS: EXISTING TO BE REMOVED**

A. Provide 2 sets of new landing call buttons and fixture plates. DO NOT INSTALL VANDAL PROOF BUTTONS.

B. Fixtures for intermediate landings shall contain "UP" and "DOWN" buttons. Fixtures for terminal landings shall contain a single "UP" or "DOWN" button.

C. The direction of each button shall be legibly and indelibly identified by arrows not less than 1/2 inch high in the face of each button.

D. Each button shall contain an integral registration light that shall illuminate upon registration of a call and shall extinguish when the call is answered. Install LED type light bulbs, white in color, in hall pushbuttons.

E. If a landing button is operated while the car and hoistway doors are closing at that floor, the call shall be registered for the next elevator. Calls so registered shall be canceled if closing doors are re-opened by means of "DOOR OPEN" button, or infrared curtain unit.

F. Elevator S-1 Interstitial floors: Replace existing hall push buttons in existing boxes. Size of plate and button to match existing.

## **2.32 MAIN CAR OPERATING PANEL**

A. Locate the main car operating panel in the car enclosure on the front return panel for elevators. The top floor car call push button shall not be more than 1220 mm (48 in.) above the finished floor. Car call push buttons and indicator lights shall be round with a minimum diameter of 25 mm (1 in.), LED white light illuminated.

B. One piece front faceplate, with edges beveled 15 degrees, shall have the firefighters' service panel recessed into the upper section and the service operation panel recessed into the lower section, fitted with hinged doors. Doors shall have concealed hinges, be in the same front plane as the faceplate and fitted with cylinder type key operated locks. Secure the faceplate with stainless steel tamperproof screws.

C. All terminology on the main car operating panel shall be raised or engraved. Use 6 mm (1/4 in.) letters to identify all devices in upper section of the main car operating panel. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.

D. The upper section shall contain the following items in order listed from top to bottom:

1. Engrave elevator number, 25 mm (1 in.) high with black paint for contrast.
2. Engrave capacity plate information with black paint for contrast with freight loading class and number of passengers allowed.
3. Emergency car lighting system consisting of a rechargeable battery, charger, controls, and LED illuminated light fixture. The system shall automatically provide emergency light in the car upon failure or interruption of the normal car lighting service, and function irrespective of the position of the light control switch in the car. The system shall be capable of maintaining a minimum illumination of 1.0 foot-candle when measured 1220 mm (48 in.) above the car floor and approximately 305 mm (12 in.) in front of the car operating panel, for not less than four (4) hours.
4. LED illuminated digital car position indicator with direction arrows. Digital display floor numbers and direction arrows shall be a minimum of 50mm (2 in.) high.
5. Firefighters' Emergency Operation Panel shall conform to the requirements of ASME A17.1 Section 2.27. Firefighters' Panel shall be 1676 mm (66 in.) minimum to 1830 mm (72 in.) maximum to the top of the panel above finished floor.
6. Firefighters' Emergency Indicator Light shall be round with a minimum diameter of 25 mm (1 in.).
7. Key operated Independent Service blank core. VA to provide core key switch. See Section 2.38 for detailed description.
8. Provide a door hold button on the faceplate next to the independent service key switch. It shall have "DOOR HOLD" indelibly marked on the button. Button shall light when activated. When activated, the front doors shall stay open for a maximum of one minute. To override the door hold timer, push a car call button or door close button. Door hold button is not ADA required and Braille in not needed.
9. Complete set of round car call push buttons, minimum diameter of 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call buttons shall be legibly and indelibly identified by a floor number



and/or letter not less than 12mm (1/2 in.) high in the face of the call button. DO NOT INSTALL VANDAL PROOF BUTTONS.

10. Door Open and Door Close buttons shall be located below the car call buttons. They shall have "OPEN" and "CLOSE" legibly and indelibly identified by letters in the face of the respective button. The Door Open button shall be located closest to the door jamb as required by ADA.
11. Red Emergency Alarm button that shall be located below the car operating buttons. Mount the emergency alarm button not lower than 890 mm (35 in.) above the finished floor. It shall be connected to audible signaling devices as required by A17.1 Rule 2.27.1.2. Provide audible signaling devices including the necessary wiring.
12. Emergency Help push button shall activate two way communications by Auto Dial telephone system as required by ASME A17.1 Rule 2.27.1.1.3. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12 mm (1/2 in.) high letters. Engrave "PUSH TO TALK" above the button
13. Provide a corresponding Braille plate on the left side of each button. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.

E. The service operation panel, in the lower section shall contain the following items:

1. Light switch labeled "LIGHTS" for controlling interior car lighting with its two position toggle switch marked "ON" and "OFF".
2. Inspection switch that will disconnect normal operation and activate hoistway access switches at terminal landings. Switch shall be labeled "INSPECTION" with its two position toggle switch marked "ON" and "OFF".
3. Three position toggle switch labeled "FAN" with its positions marked "HIGH", "LOW" and "OFF" for controlling car ventilating blower.
4. Two position, spring return, toggle switch or push button to test the emergency light and alarm device. It shall be labeled "TEST EMERGENCY LIGHT AND ALARM".
5. Two position emergency stop switch, when operated, shall interrupt power supply and stop the elevator independently of regular operating devices. Emergency stop switch shall be marked "PULL TO STOP" and "PUSH TO RUN".

### **2.33 AUXILIARY CAR OPERATING PANEL**

A. Provide an auxiliary car operating panel on the side wall opposite the main car operating panel between the 2 handrails toward the front door. The auxiliary car operating panel shall contain only those controls essential to passenger (public) operation. The auxiliary car operating panel faceplate shall match the main car operating panel faceplate in material and general design. Secure the faceplate with stainless steel tamperproof screws.

1. Mount door "OPEN" and door "CLOSE" buttons closest to the door jamb and mount the alarm button no lower than 875 mm (35 in.) above the finished floor. The Door Open button shall be located closest to the door as required by ADA.
2. Complete set of round car call push buttons, minimum diameter 25 mm (1 in.), and LED white light illuminated, corresponding to the floors served. Car call button shall be legibly and indelibly identified by a floor number and/or letter not less than 12 mm (1/2 in.) high in the face of the call button corresponding to the numbers of the main car operating buttons. DO NOT INSTALL VANDAL PROOF BUTTONS.

3. The auxiliary car operating panel faceplate shall match the main car operating panel faceplate in material and general design. Secure the faceplate with non-corrosive white metal spanner head or bristol head tamperproof screws.

4. Cross-connect all buttons in the auxiliary car operating panels to their corresponding buttons in the main car operating panel. Registration of a car call shall cause the corresponding button to illuminate in the main and auxiliary car operating panel.

5. Emergency Help push button shall activate two way communications by Auto Dial telephone system as required by ASME A17.1 Rule 2.27.1.1.3. Help button shall be LED white light illuminated and flash when call is acknowledged. Legibly and indelibly label the button "HELP" in the face of the button with 12 mm (1/2 in.) high letters. Install emergency telephone system in the auxiliary car operating panel. Engrave "PUSH TO TALK" above button.

6. Provide a corresponding Braille plate on the left side of each button. The handicapped markings with contrasting background shall be recessed .030 inch in the faceplate, square or rectangular in shape, with the finished face of the 12 mm (1/2 in.) numerals and markings flush with the faceplates. Surface mounted plates are not acceptable.

#### **2.34 ELEVATOR S-1 INTERSTITIAL CAR OPERATING PANEL; NEW**

A. Remove existing plate and buttons. Reuse existing box. New car operating panel to contain floor call push buttons and key switch. When key switch is activated, the elevator shall be remove from automatic service. The elevator shall be operable to answer interstitial calls only. Car operating buttons shall match new buttons in main and auxiliary car operating panels. Engrave under key switch "INTERSTITIAL OPERATION" in 1/4 inch letters.

#### **2.35 GROUP AUTOMATIC OPERATION**

A. Elevators S-1 through S-4 shall have group automatic operation and shall operate in a single group.

B. Basic operating devices shall consist of dispatch buttons in each car, landing call buttons and a group supervisory control system, all electrically connected to the control equipment governing selection of landing stops to be made, direction of travel, starting , acceleration, deceleration and stopping of the elevator car and the systematic dispatching operations of the elevators a specified herein.

C. Upon entering car, passengers shall press car button corresponding to landings to which they wish to go. After hoistway door interlock and car door landing circuits are established, car shall automatically start, accelerate, decelerate and stop at first landing for which car dispatch button has been pressed or for which landing calls have been registered corresponding to the direction in which car is traveling. Car shall than continue to serve remaining car dispatch and landing calls with car stops being made in order in which landings are reached irrespective of the sequence in which buttons are pressed, provided that button for landing has been pressed sufficiently in advance of car arrival at that landing to permit car to slow down and stop. Only one car, the nearest one traveling the appropriate direction, shall stop in response to a landing button call.

D. If first car approaching floor in direction for which landing call button has been pressed is traveling nonstop because of action of independent service operation, landing call shall be automatically transferred and served by next car approaching landing in desired direction.

E. Simultaneous to the initiation of the slowdown of a car for a landing call, the call shall be automatically canceled. Calls registered on car buttons shall be canceled in the same manner.

F. When car arrives at intermediate landing, hoistway door and car door shall open automatically and shall remain open for predetermined adjustable time interval. The time interval at intermediate landings shall be less for a stop in response to a car call than for a stop in response to a landing call and shall be shortened upon completion of the transfer of passengers or upon the operation of a door close button in the respective car. After expiration of time interval, hoistway doors and car door shall close automatically and car shall proceed to answer registered calls. The time interval at a dispatching terminal shall be as specified, here in, under the group supervisory control system. Hall push button calls shall hold doors open for 7 seconds and car operating panel button calls shall hold doors open for 5 seconds.

G. Any landing call which is not answered within an adjustable time (approximately 60 seconds) shall cause preferential service to be dispatched to the individual call or to the zone which contains that unanswered call.

H. A car that has no car calls registered arriving at a floor where both up and down landing calls are registered will initially respond to the landing call in the direction that the car was traveling and if no car call in that direction registered within a predetermined, adjustable period, that car will respond to the change of direction and the lantern gong will sound.

I. Hall position indicators shall always show the direction in which the car will next travel.

J. Car Lights and Blowers Lights and blower in the elevator shall be wired so that they will not shut-off when elevator is idle.

K. Delayed Car: When any car becomes shut-down or delayed for a predetermined time interval after it receives start signal, system shall automatically permit remaining cars in group to respond to signals and to be dispatched in normal manner. When cause of delay is corrected, car shall automatically resume normal operation, unless it has been manually removed from system.

## **2.36 GROUP SUPERVISORY SYSTEM**

A. Group supervisory control system for elevators S-1 through S-4 shall govern the movement of the individual car in the group in a fully zoned system to provide the maximum efficiency in serving the hospital traffic demands. The system shall electronically calculate and continuously evaluate the varying traffic demands and automatically change the method of dispatching or send cars to various sections of the hospital as appropriate, to provide an effective response to the landing calls of prevalent traffic. The system shall function to accommodate the anticipated varying hospital traffic demands and be sufficiently flexible so that it can be modified to accommodate changes in traffic patterns.

1. The system shall be arranged to maintain movement of car to satisfy all traffic demands which occur throughout the day. The system shall function on the basis of conditions as they exist at the present time and not on conditions as measured in a receding time period.

2. Any car, after satisfying all car calls and corridor calls in its direction of travel, shall become available for immediate dispatch to any part of the hospital where demand exists regardless of location or direction of travel. No car shall invariably make a through trip to either terminal unless a demand exists at that terminal

3. The system shall always dispatch an available car to the main dispatching terminal when no other car is at or approaching this floor.

4. Cars shall be selected for dispatch by a non-sequence selection system. The system shall select from available cars and assign car for loading. Cars shall be selected substantially in the order of arrival at the dispatching terminal.

B. Two-way dispatching shall function during periods of appreciable traffic demand in both the up and down directions. The cars shall be dispatched up or down as appropriate to respond to the prevailing traffic demand. Each car shall answer unassigned landing calls ahead of it in its direction of travel until all calls not subject to lead bypass have been answered. The method of dispatching shall include:

1. Dispatching the cars from predetermined zones consisting of an approximate division of the floors served by the number of elevators in the (respective) group unless the anticipated traffic demands should dictate otherwise. A car, after responding to the last call in an unoccupied zone, shall become the available car for that zone. Other cars that become available shall be assigned to other zones. Available cars shall respond immediately to a demand in an unoccupied zone, or if the demand in a zone exceeds an adjustable predetermined number, an additional available car shall be dispatched to that zone.
2. Dispatching the cars from landings at which they become available. A car, after answering its last call, shall become available at the landing at which it made its last stop. Available cars at any landing shall be assigned and dispatched to answer service demands in a manner which shall provide equitable service to all floors.
3. An available car without a demand for service shall park with its doors closed.
4. The dispatching method shall be sufficiently flexible to provide efficient service for two-way traffic that becomes predominant in either the up or down direction.

C. Off-hour dispatching shall function when the traffic demands subside to a degree of very light or inactive status. As the cars become inactive, they shall park with doors closed in assigned zones or seek an unoccupied zone. One car shall be stationed at the first floor with doors closed and hall position indicator light illuminated. With no demand for service after a predetermined time, the doors on the car at the lobby floor will close and shall shut down. When a demand for service occurs, the car or cars in the zone of demand shall be placed back in service automatically in order to satisfy the demand

## **2.37 MEDICAL EMERGENCY SERVICE**

A. Provisions shall be made for calling elevators S-1, S-2, S-3, S-4 on "Medical Emergency" operating independently from the dispatch signals and landing call signals. Provide a two-position, key-operated, momentary contact, spring return switch at each floor.

B. Install key switch in one of the floor landing push button fixture above the push buttons.

C. Landing key switches shall be momentary pressure-spring return to "OFF" position. Provide a call registered light indicator adjacent to key switch. The landing key switch and the "Medical Emergency" key switch in the car shall not be operable by keys used for any other purpose in the hospital.

D. When switch is activated at any floor, the call register light indicator shall illuminate at that floor only, and the elevator supervisory control system shall instantly select the nearest available elevator in service to respond to the medical emergency call. Immediately upon selection, all car calls within that car shall be cancelled. Transfer any landing calls which had previously been assigned that car to another car. If the selected car is traveling away from the medical emergency call, it shall slow down and stop at the nearest floor, maintain closed doors, reverse direction and proceed nonstop to the medical emergency call floor. If the selected car is traveling toward the medical emergency call floor, it shall proceed to that floor nonstop. If at the time of selection it is slowing

down for a stop, the car shall stop, maintain doors closed, and start immediately toward the medical emergency floor.

E. Arriving at the medical emergency floor, the car shall remain with doors open for 30 seconds. After this interval has expired and the car has not been placed on medical emergency operation from within the car, the car shall automatically return to normal service.

F. Locate a "Medical Emergency" key switch in the upper section of each main car operating panel for selecting medical emergency service. Activation of the key switch will allow the car to accept a car call for any floor, close doors, and proceed nonstop to the floor desired. The return of the key switch to normal position will restore the car to normal service. The key shall be removable only in the off position.

G. Any car in the group which is in group service may be selected. Additional medical emergency calls, as they are registered in the system, shall cause additional cars to respond as described below, always on the basis of one medical emergency call per car.

H. Provide an LED illuminated indicator light next to the Medical Emergency key switch the same size as the Fire Service indicator. In the center of the rear cab panel provide a back lighted "MEDICAL EMERGENCY" LED illuminated display that shall flash on and off continuously when the car is assigned to this operation and until it is restored to normal service. "MEDICAL EMERGENCY" indicator shall be a photographic negative type 72 in. to center above the floor, 6 in. wide X 3 in. high, with 1/2 in. high letters and legible only when illuminated.

I. All of the key switches in the "Medical Emergency" system for each and every elevator shall operate from the same key. The medical emergency call service key shall not operate any other key switch in the elevator system, nor shall any other key required by the elevator system be able to operate the medical emergency call service switches.

J. Should all the cars be operating on "Independent Service", the medical emergency service indicator lights in the car operating panel and rear wall shall be illuminated, buzzer shall sound, and the "Audio Voice" system shall direct the attendant to return the car to automatic operation.

1. Engrave an instruction plate on the main car operating panel for the attendant to follow when the service is activated.

K. Should all the cars be out of service and unable to answer medical emergency calls, the call register light shall not illuminate.

L. Each switch faceplate shall have legible indelible legends engraved or etched to indicate its identity and positions. All letters in faceplates shall be 6 mm (1/4 in.) high, filled with black paint.

M. When Phase I fire recall is activated it shall over-ride elevators on medical emergency service and return them to the main or alternate fire service recall floor. When the fire emergency floor has been identified the attendants may complete their medical emergency run on Phase II firefighters' operation if life safety is not affected.

N. Provide four (4) keys for each "Medical Emergency" key cylinder furnished.

## **2.38 INDEPENDENT SERVICE**

A. A two-position key operated "INDEPENDENT SERVICE" switch shall be provided in the main car operating panel which shall have its positions marked "ON" and "OFF". Provide a blank core. VA to provide correct core and key switch. When the switch is in the "ON" position, the car shall respond only to calls registered on its car dispatch and shall bypass all calls registered on landing push-buttons. Car and hoistway doors shall not close until a car button or the "DOOR CLOSE" button is pressed and held until interlock circuits are made up. When switch is

returned to "OFF" position, normal service shall be resumed. In addition, the elevator shall be disconnected from the automatic dispatching system and the hall position indicators and the highest call reversal shall not be effective.

### **2.39 FIRE SERVICE: REUSE EXISTING**

- A. Provide fire service as per the ASME A17.1 Code.
- B. Elevators S-1 through S-4 (one group), reuse existing machine room and lobby smoke detectors.
- C. Smoke Detectors: When a machine room smoke detector is activated all 10 elevators go into Phase 1 fire service mode. When an elevator group lobby smoke detector is activated, also all 10 elevators shall respond to phase one fire recall.
- D. Upon activation of an elevator lobby or machine room smoke detection device, a signal shall be transmitted to the building fire alarm control panel. The alarm signal shall be transmitted from the fire panel to the elevator controller which shall activate the "PHASE ONE FIRE SERVICE" operation. The alarm signal shall be received from any group elevator lobby or machine room smoke detector except the smoke detector located at the main floor lobby. The main floor (First Floor) lobby smoke detector shall send the elevators to a designated alternate floor (Ground).
- E. When an alarm signal initiates Phase one operation, momentary movement of the "FIRE SERVICE" key in the lobby hall push button plate to the "RESET" position shall be required to return elevators to automatic operation if alarm signal is cleared.
- F. Install one new fire service switch in main first floor hall push button plate.
- G. First floor is main floor, ground floor is alternate fire floor.

### **2.40 HEAT DETECTORS, SHUNT TRIP CIRCUIT BREAKERS; REUSE EXISTING**

- A. Reuse existing shunt trip circuit breakers located in machine room.
- B. Reuse existing heat detectors in elevator machine room in accordance with NFPA 72 Code.
- C. The heat detectors shall be connected to the fire alarm control panel. When activated by the heat detectors, the fire alarm control panel shall send a supervised signal to the elevator machine room in the form of a relay with a set of 110 Volt "C" contacts for each elevator. The 110 volt circuit to be on emergency power system. The relay shall be located in the machine room. Power shall be removed from each elevator controller by activating an independently controlled shunt trip circuit breaker when the temperature in the machine room exceeds the setting of the heat detector.
- D. The heat detector system shall be independent of the fire service system.

### **2.41 AUDIO VOICE SYSTEM: NEW**

- A. Provide new audio voice system activated by stopping or passing a floor. Audio voice to give floor designations. The voice announcer shall be a digitized floor announcer that will announce the floor numbers and direction of travel and special announcements. The voice announcer shall be a natural human voice that recites messages and shall comply with ADA requirements for audible car position indicators. The voice announcer shall be a full range loudspeaker to be located on top of the cab or in the main car operating panel as directed by the COR. The voice announcer unit shall contain 21 ports which can accommodate 21 standard floors and direction messages. Install voice announcer per manufacturer's recommendations and instructions. The voice announcer shall be the product of one manufacturer of established reputation. Provide manufacturer literature and list of voice messages. Provide special messages as directed by COR.

1. Fire service message. "This elevator is out of service for a fire service emergency. Please evacuate the elevator".
2. "Please do not block doors".
3. Medical emergency message. "This elevator is out of service for a medical emergency. Please evacuate the elevator".
4. Provide any special messages as directed by COR.

#### **2.42 CAR POSITION INDICATOR**

A. Provide an L.E.D. digital type of car position indicator for elevators. Locate in main car operating panel. L.E.D. digital readouts for floor numbers and direction arrows shall be a minimum of 2 inches high. Remove existing car position indicator.

#### **2.43 HALL POSITION INDICATOR:**

A. Remove and replace existing hall position indicators and hall lanterns. Provide new L.E.D. digital type hall position indicators at all floors. Locate above top of door entrance jamb. Provide stainless steel plate to cover any existing boxes. Hall position indicators shall match the hall position indicators located in Building 258. Hall position direction indicators shall be equipped with a clearly audible gong that shall sound once for "UPWARD" bound car and twice for "DOWNWARD" bound car when landing at floor. Audible signal shall not sound when a car passes the floor without stopping.

#### **2.44 MACHINE ROOM INDICATOR PANEL:**

A. Disconnect and remove existing machine room large indicator panel. Remove all wiring and piping.

B. Provide Motion Control Elevator "iView" Monitor Diagnostic System. Locate in a controller or in a lockable enclosure.

1. The contractor shall provide for "troubleshooting" shutdowns and elevator problems to be displayed on i Monitor. This shall consist of total diagnostics of operation.

C. The "iView" Monitor system shall also contain illuminated indicators to provide the following information:

1. The floor where each elevator is currently located.
2. The direction in which each elevator is currently traveling or is scheduled to travel.
3. The location and direction of each currently registered hall call. These lamps shall extinguish as each call is answered.
4. Which elevator is currently out of service.
5. Which elevator is currently bypassing hall calls.
6. Which elevator is currently engaged in passenger transfers.
7. Operations program under which entire group is currently operating.
8. Zone divisions of the entire group.

#### **2.45 HOISTWAY ACCESS SWITCHES: NEW**

A. Remove existing top and bottom floor access switches from door jamb.

B. Provide hoistway access switches for elevator at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Elevators with side slide doors, mount the access key switch 1830 mm (6 ft) above the corridor floor next to the strike jamb. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions. Submit design and location of access switches for

approval. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center. Arrange the hoistway switch to initiate and maintain movement of the car. When the elevator is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor.

C. Provide emergency access for all hoistway entrances, keyways for passenger elevators.

#### **2.46 HOISTWAY ENTRANCES: RETAIN EXISTING**

A. Reuse existing entrances frames and re-skin with new stainless steel covering both sides of curved of door jamb and header entrances except ground floor S-2, S-3, S-4, and first floor S-1, S-2, S-3. Reuse existing sills, hanger supports, strut angles and fascia plates. Install new toe guards to meet A17.1 Elevator code.

C. Remove existing door jambs (sides and header). Replace with new stainless steel frames and header that matches existing and all other service elevator door jamb entrances. Grout side jambs from floor up to  $\frac{1}{2}$  height of jamb. Entrances to be changed.

1. Ground floor. Elevators S-2, S-3, S-4.

2. First floor. Elevators S-1, S-2, S-3.

B. Remove existing and provide new door tracks, stainless steel hoistway doors, door rollers, hangers, pick up and release arms, beaks and rollers, door gibs, bumpers and door closers.

C. Provide hoistway entrance with new flush side slide opening hoistway doors. Door panels shall be not less than 16-gauge stainless steel, flush type construction, and not less than 32 mm (1 1/4 in.) thick. Wrap stainless steel around the leading and trailing edges of the door panel. Top and bottom of door panels shall have continuous stiffener channels welded in place. Reinforcement of the door panels shall be approximately 1.0 mm (0.04 in.) in thickness and of the hat section type. At bottom of each and every panel, provide two removable laminated phenolic gibs or other approved material guides and a separate fire gib. Reinforce each door panel for hangers, interlock mechanism, drive assembly, and closer. One door panel for each entrance shall bear a BOCA label, Underwriters' label, or in lieu of this, labels from other accredited test laboratories may be furnished provided they are based on fire test reports and factory inspection procedures acceptable to the COR. Fasten sight guard of 14-gauge stainless steel, extending full height of panel, to leading edge of each panel of center opening doors.

D. Provide hangers for hoistway door panels and provide relating devices to transmit motion from one door panel to the other. Fasten the hangers to the door sections. Provide reinforcements at the point of attachment. The hanger shall have provisions for vertical and lateral adjustments. Hang doors on two-point suspension hangers having sealed ball-bearing sheaves not less than 76 mm (3 in.) in diameter, with rubber or non-metallic sound-reducing tires mounted on a malleable iron or steel bracket. The hanger sheaves shall operate at a relatively low rotational speed, and shall roll on a high-carbon, cold-rolled or drawn steel track shaped to permit free movement of sheaves without regard to vertical adjustment of sheave, bracket or housing. Beneath the track and each hanger sheave, provide a hardened steel up-thrust roller capable of withstanding a vertical thrust equal to the carrying capacity of adjacent upper sheave. The up-thrust shall have fine vertical adjustments, and the face of the roller shaped so as to permit free movement of the hanger sheave. The up-thrust roller shall have ball or roller bearings. Provide the hanger sheaves with steel fire stops to prevent disengagement from tracks.



E. Do not use hangers that are constructed integrally with the door panels.

F. Provide raised numerals on cast, rear mounted plates for all openings. Numerals shall be a minimum of 50 mm (2 in.) high, located on each side of entrance frame, with centerline of 1524 mm (5 ft) above the landing sill. The number plates shall contain Braille.

G. Provide unique car number on every elevator entrance at designated main fire service floor level, minimum 76 mm (3 in.) in height.

H. Install drop key escusion holes on all hoistway doors.

I. Replace any missing hoistway dust covers.

#### **2.47 ELECTRIC POWER DOOR OPERATORS: PROVIDE NEW**

A. Provide new heavy duty, high speed door operator, header, tracks, arms, etc. with a new door operator. Door operator shall automatically open the car and hoistway doors simultaneously when the car is level and automatically close the doors simultaneously at the expiration of the open timing. Motor shall be of the high internal resistance type, capable of withstanding high currents resulting from stall without damage to the motor. The door operator shall be capable of opening a car door and hoistway door simultaneously at a maximum speed of not less than 2 feet per second. The closing speed shall be one foot per second. A reversal of direction of the doors from the closing to opening operation whether initiated by the infrared curtain unit, or the door open button, shall be accomplished within no more than 1-1/2 inches of door movement. Particular emphasis is to be placed on obtaining quiet interlock and door operation and smooth, fast, dynamic braking for door reversals and stopping of the doors at both extremes of travel. All levers operating the doors shall be constructed of heavy steel members and all pivot points shall have ball or roller bearings. Electric power shall be used to open and close the doors. Springs may be used for auxiliary automatic door closers required under Rule 2.11.3 of the Code.

B. Door operator shall open and close both car and hoistway door simultaneously. Inherent design and installation of door operating devices shall be such as to preclude possibility of any hoistway door panel being disengaged from operating devices under any condition of operation of cars. Doors shall open automatically when car has stopped at landing. Doors shall be synchronized with operation of leveling car and opening car and hoistway doors simultaneously. Car and hoistway doors shall close automatically after an adjustable predetermined time sufficient to allow passengers to enter and leave the car. Before the interlock circuit is established, hoistway door for landing shall lock and remain in closed position until the car makes another stop at that landing.

C. Door shall operate smoothly and without slam in opening and closing directions and shall be cushioned in final movement in each direction of travel by regulated and adjustable electric power or other equally effective means. No electrical power shall be required to hold doors either open or closed. Hoistway doors shall be provided with door closers arranged to close open doors automatically if car for any reason leaves landing zone. In case of interruption or failure of electric power, mechanism shall permit manual opening from within car at door zone only. Door operator shall operate in conjunction with, incorporate in its design, or be equipped with interlocks or safety switches. It shall not be possible for the doors to open by power unless the elevator is within the leveling zone. Elevator, when out of the leveling zone, is restricted to 4 inch opening. Provide door locking device as per code.

D. Provide new infrared curtain units for all elevators. The device shall cause the car and hoistway doors to reverse automatically to the fully open position should the unit be actuated while the doors are closing. Curtain unit shall function at all times when the doors are not closed, irrespective of all other operating features.

E. Should the doors be prevented from closing for more than a predetermined adjustable interval of 30 to 60 seconds by operation of the curtain unit or door open button, these devices shall be rendered unable to cause door reversals, the doors shall stay open, a buzzer located on the car shall sound and a audio voice message will say "Please do not block the doors". Doors shall not close on "nudging".

F. Provide car and hoistway door open and close buttons. When the door open button is pressed, the doors, if in the open position, shall remain open, or if the doors are closing, they shall stop, reverse and re-open. Momentary pressure of the door close button shall initiate the closing of the doors prior to the expiration of the normal door open time. The open and close buttons shall be located in the car operating station below the floor buttons. The door open button shall be located adjacent to the door opening.

G. Should the doors be prevented from closing by an obstruction, that does not activate a door re-opening device, for more than an adjustable interval of 15 to 60 seconds, the doors shall automatically reverse to the fully opened position.

H. Provide new door clutch and related door equipment.

#### **2.48 ELECTRIC INTERLOCKS: NEW**

A. Replace each hoistway door interlock with a new interlock functioning as a hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position as defined by the Code. Interlock shall prevent opening of hoistway door from corridor side, unless car is at rest at landing, is operating in leveling zone at landing, or hoistway access switch is used.

B. Hoistway door interlock shall not be accepted unless it has successfully met requirements of Rule 2.12.6 of the Code. Approved devices shall be securely fastened to the car and shall be arranged to operate the interlocks without objectionable noise, shock or jar.

C. New wiring installed from the hoistway riser to each door interlock shall be NEC Type SF-2 or equal.

D. Equip car doors with electric contact which prevents operation of car until door is closed as defined in the Code, unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car. Car door contact shall not be accepted unless it has successfully met requirements of Rule 2.12.6 of the Code.

E. Provide devices, either mechanical or electrical, which shall prevent operation of the elevator in event an accident to or defective door operator equipment has permitted an independent door panel to remain in the "UNCLOSED" or "UNLOCKED" position.

#### **2.49 CAR SLING: REUSE EXISTING CAR SLINGS**

A. Present car frame shall be checked for proper alignment and correct if necessary. All bolt connections shall be checked, tightened or replaced, where necessary.

B. Reuse existing safety operating switch (SOS) switch on top of car.

#### **2.50 CAR PLATFORM SERVICE ELEVATORS:**

A. Reuse existing platform. Remove existing and install new aluminum diamond plate flooring.

b. Reuse existing car sills.

C. Install new toe guard to meet A17.1 Elevator Code.

## **2.51 CAR ENCLOSURE FOR ELEVATORS:**

A. Reuse existing cab. Re-skin existing cab front return panels, headers and strike jambs with new stainless steel to match existing stainless steel fronts.

B. Remove existing laminate on side and rear walls on elevators S-2, S-3, S-4 and existing textured stainless steel on S-1. Re-skin existing side and rear walls from floor to ceiling with new textured stainless steel. All joints shall be smooth and flush with no ragged or broken edges. Type, design and color to be selected by COR.

C. Repaint ceiling bright white. Install new drop ceiling with flat plastic laminate and egg crate type panels in new aluminum frame. Provide splines to create six panels in ceiling. Type panel, frame, and color to be selected by COR. Elevator S-1. Make new ceiling to be the Same depth as the existing ceiling.

D. Install new cab ceiling lighting. Install 4 sets (2 lights per set) of T-8 fluorescent light tubes 4 ft long with new ballasts.

E. Remove existing cab handrails. Provide car enclosure with two sets of stainless steel handrails.

1. 75 mm (3 in.) wide x 9 mm (3/8 in.) thick flatstock located with centerlines 750 mm and 1050 mm (30 in. and 42 in.) above the car floor.

2. Locate handrails 38 mm (1 1/2 in.) from cab wall. Install handrails on two side and rear walls. Curve ends of handrails to walls. Conceal all handrail fastenings. Handrails shall be removable from inside the car enclosure.

3. Elevator S-1; Install new handrails on one full side and rear wall. On wall that has interstitial door, run handrails from 3 inches of interstitial door entrance to front. These handrails shall match the other new handrails in cab and shall stop by strike jamb like the side handrails on other service elevators.

F. New emergency car lighting system. Install in new main car operating panel. Remove existing emergency light from cab ceiling. Cover existing hole.

G. Replace existing fan blowers. Provide a blower unit arranged to exhaust through existing opening in the canopy. Provide a stainless steel or chrome plated fan grill around the opening. Provide a 2-speed type unit, capable of rated free delivery air displacement of approximately 380 and 700 cfm at respective speeds. Mount unit on top of car with rubber insulation to prevent transmission of vibration to car structure. Provide screening over exhaust end of blower. Provide a 3-position switch to control the unit in the main car operating panel.

H. Remove existing electrical outlet in cab located below main car operating panel. Install new GFI electrical outlets with stainless steel faceplates where existing outlets are now located.

I. Reuse existing emergency exit electrical contact switch to prevent operation of elevator when emergency exit is open.

J. Provide entrances with new side slide opening horizontal sliding car doors. Construct door panels to be flush hollow metal construction, not less than one inch thick, consisting of not less than one piece continuous, 16 gauge stainless steel on car face side and leading and trailing edges. Separate by two plates of sound deadening material, and reinforce by steel shapes welded to the plates at frequent intervals. Reinforce panels as required for installation of hanger, power operating and door opening devices. Hang doors on two point suspension hangers having ball bearing sheaves not less than 3 inches in diameter, with rubber or non-metallic sound reducing tires. Equip hangers with adjustable ball bearing rollers to take up thrust of panels. Up thrust roller shall be capable of being locked in position after adjustments to a maximum of 0.015 inch clearance.

Provide two non-metallic gibs on each door panel. Gibs shall be replaceable without removal of door panel.

## **2.52 INTERCOM AUTO DIAL SYSTEM; NEW**

A. Remove existing auto dial system from cab.

B. Furnish and install a complete ADA compliant auto dial phone intercommunication system.

C. Provide a two-way communication device in the car with automatic dialing, tracking and recall features with shielded wiring to car controller in machine room. When activated by the "PUSH TO TALK" button located in both the main and auxiliary car operating panels, the auto dial shall automatically dial to the OPERATOR. Provide dialer with automatic rollover capability with minimum two numbers.

D. The "PUSH TO TALK" button shall illuminate and flash when call is acknowledged. Button shall match floor push button design.

E. Provide "PUSH TO TALK" button tactile symbol engraved signage and Braille adjacent to button mounted integral with car operating panels.

F. The auto dial system shall be located in the auxiliary car operating panel. The speaker and unit shall be mounted on the backside of the perforated stainless steel plate cover.

G. Each elevator shall have individual phone numbers.

H. If the operator ends the call, the phone shall be able to redial immediately.

## **2.53 SEISMIC REQUIREMENTS**

A. Meet the requirements of ASME A17.1 Section 8.4, Elevator Safety Requirements for Seismic Risk Zone 2 or greater and VA Seismic Design Manual H-18-8.

B. Support and maintain hoisting machines, controllers in place to prevent any component from sliding, rotating, overturning, or jumping under conditions imposed by seismic forces not less than that required to produce an acceleration of gravity horizontally and 1/2 gravity vertically acting simultaneously. Design the total system to continue operation without interruption under specified seismic acceleration, as outlined in H-18-8.

C. Provide hoisting machines mounted on vibration isolators with separate isolated seismic restraints.

D. Controllers and supervisory panel shall be bolted to the floor, and provided with sway braces at the top. Secure all electrical components within the panels to the panel frame. Fit cabinet doors with positive locking latches.

E. Provide counterweight guide rails with intermediate brackets in sufficient number so that the counterweight frame shall span no less than two brackets in its full length anywhere in the hoistway. Each pair of intermediate brackets as well as brackets located at each floor line shall have a horizontal tie of sufficient strength to contain the counterweight. Locate the horizontal tie member between the counterweight and the elevator car, and do not attach to the car guide rail or channel backing.

F. Provide two counterweight derailment sensing wires vertically on the car side of the counterweight the entire height of travel. The counterweight frame shall be equipped with four derailment rings. Provide counterweight displacement switch. In the event the switch is activated, the corresponding elevator shall stop immediately and then proceed in the direction away from the counterweight to the next floor at a speed not exceeding 0.76 m/s (150 FPM). Upon arrival at the next floor, the elevator shall shut down with its door open. An indicator pilot light shall illuminate when the counterweight derailment detector is activated. This pilot shall be fully identified and shall be located in the machine room indicator panel, or if no machine room indicator panel is specified, locate pilot

light in a conspicuous place on the front of the elevator controller, not obstructed by controller door panels.

G. Provide box in machine room for seismic switch to activate seismic operation, a minimum of one seismic switch per elevator or group of elevators.

### **PART 3 - EXECUTION**

#### **3.1 SPACE CONDITIONS**

A. Attention is called to existing overhead clearances, pit clearances, overall spaces available in hoistway and machine room and machine room environmental conditions in connection with completion of specified elevator work. Provide proper, satisfactory and code legal installation of equipment as a whole, including all construction, accessories, and devices in connection with elevator, mechanical and electrical work specified herein.

B. Any construction changes or relocation of equipment, conduit, wiring, etc., required to accomplish the specified elevator installation must be arranged and obtained by the contractor, subject to the approval of the Contracting officer or COR. Cost of such changes shall be included in the base bid and shall form a part of the contract.

#### **3.2 ARRANGEMENT OF EQUIPMENT:**

A. Clearance around new elevator, mechanical and electrical equipment shall comply with applicable provisions of NEC. Arrange new equipment so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same area.

#### **3.3 WORKMANSHIP AND PROTECTION**

A. All installations shall be made in a first class, neat and skillful manner by mechanics experienced in the trade involved. All details of the installation shall be mechanically and electrically correct. All materials and equipment shall be new and without imperfections.

B. Patch any existing holes in hoistway walls to meet fire rating.

C. Recesses, cutouts, slots, holes, patching, grouting, refinishing and the like to accommodate installation of equipment shall be included in the elevator contractor's work. All new holes in concrete shall be core drilled.

D. No structural members shall be cut or altered. Work in place which is damaged or defaced shall be restored equal to original condition.

E. Finished work shall be straight, level and plumb, with true, sharp surfaces and lines. All machinery and equipment shall be protected against dirt, water, or mechanical injury. At final completion, all work shall be thoroughly cleaned and delivered in perfect unblemished condition.

F. Sleeves for all conduit and other small holes shall project two inches above concrete slabs.

G. Where beams, slabs, or other building construction protrude more than four (4) inches into the hoistway, all top surfaces shall be leveled with 20 gauge steel at an angle of at least 75 degrees to the horizontal.

H. Contractor shall provide and maintain adequate fire extinguishers on site and in the areas where welding or cutting is to occur.

**3.4 PRETESTS AND TESTS:** Pretest, as per specifications, the elevators and related equipment, in the presence of the COR for proper operation before requesting final inspection.

A. Procedure outlined in the "Practice for Inspection of Elevators, Escalators and Moving Walks (Inspectors Manual)' ASME A17.2 shall apply.

1. Final test shall be conducted in the presence of and witnessed by the Veterans Administration Consulting Support Office (003C5), Elevator Engineers or an ASME QEI-1 Certified Elevator Inspector.

2. Government shall furnish electric power including necessary current for starting, testing and operating machinery of each elevator.

B. If required by the Veterans Administration elevator engineer, inspection shall be conducted at other than normal working hours.

1. Contractor shall furnish the following test instruments and materials on-site and at the designate time of inspection: properly marked testing weights, voltmeter, amp-meter, thermometers, stopwatch, direct reading tachometer and a series of "walkie-talkies".

2. If during the inspection process, the Department of Veterans Affairs representatives determine the need, the following instruments should be available within a four-hour period: megohm meter, vibration meter, sound meter and a light meter.

C. Inspection shall be made of workmanship and equipment furnished and installed for compliance with specification.

D. Balance Tests: The percent of counterbalance (40%) shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counterbalance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached at no additional cost to the VA.

E. Full Load Run Test: Elevators shall be tested for a period of one hour continuous run with full contract load in the car. During the test ran, the car shall be stopped at all floors in both directions of travel for a standing period of not less than five nor more than 10 seconds per floor.

F. Speed Test: The actual speed of the elevator shall be determined in both directions of travel with full contract load, balanced load, and no load in the elevator. Speed shall be determined by applying a tachometer to the car hoisting ropes and/or governor rope. The actual measured speed of the elevator with all loads in either direction shall be within five percent of specified rated speed.

1. Full speed runs shall be quiet and free from vibration and sway. when cars are standing at the floor with doors open, they shall remain fully stopped with hoisting machine brake applied.

G. Temperature Rise Test: The temperature rise of the hoisting motor and boosters shall be determined during the full load test run. Temperatures shall be measured by the use of thermometers inserted into the various windings. Under these conditions, the temperature rise of the equipment shall not exceed 50 degrees Centigrade above ambient temperature. Test shall be started only when all parts of equipment are within five degrees Centigrade of the ambient temperature at time of starting test. Other tests for heat runs on motors shall be as specified in the latest procedure of the Institute of Electrical and Electronic Engineers.

H. Check amp reading with empty, balanced and full load. At full load, the amp reading shall not exceed the motor nameplate amperage.

I. Car Leveling Test: Elevator car leveling devices shall be tested for accuracy of leveling at all floors with no load in car, balanced load in car and with contract load in car, in both directions of travel. Accuracy of floor leveling shall be within plus or minus 1/8 inch of level with any landing floor for which the stop has been initiated (with a definite range of distance in advance of the landing) regardless of load in car or direction of travel. The car leveling

device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 1/8 inch or level with the landing floor regardless of change in load.

J. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in down direction with no load up to and including 125 percent of contract load in the car. Up travel not required.

K. Insulation Resistance Test: The elevator's complete wiring system shall be free from short circuits and grounds and the insulation resistance of the system shall be determined by use of MEGGER, at the discretion of the Veterans Administration representative conducting the test.

L. Safety Devices and Governor Tests: The safety devices and governor shall be tested as required by Rule 8.10.2 of the Code.

M. If equipment fails, test requirements and re-inspection is required, the Contractor shall be responsible for costs of re-inspection, including salaries, transportation expenses, other expenses of the representatives of the COR.

N. Limit Stops:

1. The position of the car when stopped by each of the normal limit stops with contract load in the car shall be accurately measured. The car shall reach the terminal landings under the above condition.
2. Final position of the elevator relative to the terminal landings shall be determined when the elevator has been stopped by the final limits. The lower limit stop shall be made with contract load in the elevator. Elevator shall be operated at contract speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

O. Oil Buffer Tests: These tests shall be conducted with operating device and limit stops inoperative and with contract load in the elevator for the car buffer and with no load in the elevator for the counterweight buffer. Preliminary test shall be made at the lowest (leveling) speed. Actual tests shall be conducted at contract speed. Buffers shall compress and return to the fully extended position without oil leakage.

P. Setting of Car Door Contacts: The position of the car door at which the elevator may be started shall be measured. The distance from full closure shall not exceed that required by the Code. The test shall be made with the hoistway doors closed or the hoistway door contact inoperative.

Q. Setting of Interlocks: The position of the hoistway door at which the elevator may be started shall be measured and shall not exceed the Code Requirements.

R. Operating and Signal System: The elevator shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration. Stopping shall be without bumps or jars.

S. Performance of the elevator dispatching system shall be witnessed and approved by the COR's representative.

### **3.5 TEST RUN PERIOD**

A. Once an elevator is temporarily accepted by the VA personnel, there will be a test run of the accepted elevator for up to one week before the next elevator is turned over to the Contractor.

### **3.6 PAINTING AND FINISHING**

A. Controllers and all other uncoated ferrous metal items shall be painted not less than one factory priming coat or approved equal.

B. Upon completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster and other debris. All equipment, except that otherwise specified as to architectural finish, shall then be given two coats of paint of approved color, conforming to manufacturer's standard.

C. No field painting of governors shall be permitted.

D. Paint floor designation not less than four inches high on hoistway doors, fascias and/or walls as required by Rule 2.29.2 of the Code. The color of paint used shall contrast with the color of the surfaces to which it is applied.

E. Elevator hoistway machines, controllers, starters, relay panels and selectors shall be identified by 4-inch high numbers located as directed. Governors, shunt trip circuit breakers, and cross heads of cars shall be identified by 4-inch high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled.

F. Surface of door frames, door panels, interior cab surfaces, etc., that become damaged or marred during renovations shall be restored to original condition in a satisfactory manner before final acceptance of work.

### **3.7 INSTRUCTION OF PERSONNEL**

A. Provide instructors to train VA personnel in operation of the equipment and accessories installed under this contract, for a period of not less than one eight hour work day. Instruction shall commence after completion of all work and at such time as directed by the COR. Training shall be conducted during the hours of 7:30 AM through 4 PM.

B. In addition to oral instruction, written instructions in triplicate relative to car, adjustment and operation of all equipment and accessories shall be furnished and delivered to the COR in independently bound folders. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electric apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts lists with descriptive literature and identification and diagrammatic cuts of equipment and parts.

C. Provide any supplementary instruction for adjustment and care of new equipment that may become necessary because of changes, modification and/or replacement of equipment or operation under requirements of paragraph entitled "GUARANTEE".

### **3.8 INSPECTIONS AND MAINTENANCE SERVICE**

A. Furnish complete maintenance and inspection service on entire elevator systems. The modernized elevator systems shall be guaranteed for a period of one year beginning with the completion and acceptance of the last elevator installation by COR. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices employed supervised by the company that is providing guaranteed period of service on the elevator equipment specified herein.

B. This contract will cover full maintenance, which includes emergency call back service, inspections and preventive maintenance of each of the elevators listed in the Schedule of Elevator. The Contractor shall be required to perform WEEKLY inspections during the maintenance period. During the inspection visit, the Contractor shall clean, adjust and lubricate the equipment. Determine the nature and extent of any trouble required to restore the elevators to satisfactory service, and if conditions warrant, furnish and install parts.

C. When and as required, motors, controllers, relay panels, selectors, leveling devices, operating devices, switches, in car and in hoistways, hoistway door and car door or gate operating device, interlock contacts, guide shoes, guide rails in hoistway, and car door sills, hangers for doors, car doors or gates, signal system, car safety device, governors, tension and sheaves in pit shall be cleaned, lubricated and adjusted. Hoist motor brushes shall be checked for wear



at least every two weeks. Accumulated carbon shall be removed from the commutators, brush rigs and windings at the same time.

D. Furnish all lubricant, cleaning materials and parts required.

E. Cleaning Services: Guide rails, overhead sheaves and beams, counterweight frames, bottom of platforms and machine rooms floors shall be brushed cleaned at least once every four month. Car tops shall be cleaned monthly. All accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Necessary cleaning supplies, vacuum cleaner, shall be furnished by the Contractor.

F. Adjustment Services: All hoistway ropes shall be examined and the tension shall be adjusted whenever necessary to insure maintenance of adequate safety factors.

G. Materials to be furnished: The Contractor shall furnish all lubricants, cleaning supplies and tools necessary to perform the work described above. All lubricants shall be as recommended by the manufacturer of the equipment.

H. This guarantee service shall not include the performance of any work required as a result of improper use, accidents, or negligence for which the contractor is not directly responsible.

I. Provide 24 hour emergency call-back service which shall consist of promptly responding to calls within one hour for "TRAP CALLS" and two hours for emergency service after receiving call, should a shutdown or emergency trouble develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons in and about the elevator.

J. Service and emergency personnel shall report to the COR or his authorized representative upon arrival at the medical center and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the COR.

K. The contractor shall maintain a log in the Elevator Machine Room. The log shall list the date and time of all weekly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed or parts replaced.

L. After arriving on site to start the project, the elevators contractor shall start to maintain all elevators on this contract and continue during renovation period. This will be at no billable cost to the VAMC. This maintenance period shall be included in the renovation bid. This is separate from the one year maintenance contract which starts with the completion of project.

END SECTION 14 26 26

**SECTION 26 05 11  
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.
- C. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

**1.2 MINIMUM REQUIREMENTS**

- A. The International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.
- B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

**1.3 TEST STANDARDS**

- A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:
  - 1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having

Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.

2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
  - a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
  - b. Are periodically inspected by a NRTL.
  - c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

#### **1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)**

- A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.
- B. Product Qualification:
  1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
  2. The Government reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of

receipt of notification that service is needed. Submit name and address of service organizations.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. Applicable publications listed in all Sections of Division 26 are the latest issue, unless otherwise noted.
- B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

#### **1.6 MANUFACTURED PRODUCTS**

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available.
- B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
  - 1. Components of an assembled unit need not be products of the same manufacturer.
  - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
  - 3. Components shall be compatible with each other and with the total assembly for the intended service.
  - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
  - 1. The Government shall have the option of witnessing factory tests. The Contractor shall notify the Government through the COTR a minimum of 15 working days prior to the manufacturer's performing the factory tests.
  - 2. Four copies of certified test reports shall be furnished to the COTR two weeks prior to final inspection and not more than 90 days after completion of the tests.

3. When materials and equipment fail factory tests, and re-testing and re-inspection is required, the Contractor shall be liable for all additional expenses for the Government to witness re-testing.

#### **1.7 VARIATIONS FROM CONTRACT REQUIREMENTS**

- A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

#### **1.8 MATERIALS AND EQUIPMENT PROTECTION**

- A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
  1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
  2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
  3. Damaged equipment shall be repaired or replaced, as determined by the COTR.
  4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
  5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

#### **1.9 WORK PERFORMANCE**

- A. All electrical work shall comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J - General Environmental Controls, OSHA Part 1910 subpart K - Medical and First Aid, and OSHA Part 1910 subpart S - Electrical, in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the Contractor.

- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
  - 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
  - 2. Before initiating any work, a job specific work plan must be developed by the Contractor with a peer review conducted and documented by the COTR and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
  - 3. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the COTR.
- D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.
- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interference.

#### **1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS**

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working clearances shall not be less than specified in the NEC.
- C. Inaccessible Equipment:
  - 1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
  - 2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use

of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

- D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

#### **1.11 EQUIPMENT IDENTIFICATION**

- A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm<sup>2</sup>), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

#### 1.12 SUBMITTALS

- A. Submit to the COTR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.
- C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
  - 1. Mark the submittals, "SUBMITTED UNDER SECTION\_\_\_\_\_".
  - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
  - 3. Submit each section separately.
- E. The submittals shall include the following:
  - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
  - 2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion, etc.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.



3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.

F. Maintenance and Operation Manuals:

1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
  - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
  - b. A control sequence describing start-up, operation, and shutdown.
  - c. Description of the function of each principal item of equipment.
  - d. Installation instructions.
  - e. Safety precautions for operation and maintenance.
  - f. Diagrams and illustrations.
  - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
  - h. Performance data.
  - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments.

The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.

- j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.

H. After approval and prior to installation, furnish the COTR with one sample of each of the following:

1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
2. Each type of conduit coupling, bushing, and termination fitting.
3. Conduit hangers, clamps, and supports.
4. Duct sealing compound.
5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

#### **1.13 SINGULAR NUMBER**

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

#### **1.14 ACCEPTANCE CHECKS AND TESTS**

- A. The Contractor shall furnish the instruments, materials, and labor for tests.
- B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.

- C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests. Repair, replacement, and retesting shall be accomplished at no additional cost to the Government.

**1.15 WARRANTY**

- A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

**1.16 INSTRUCTION**

- A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.
- B. Furnish the services of competent instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be trained in operating theory as well as practical operation and maintenance procedures.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the COTR at least 30 days prior to the planned training.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

- - - END - - -

**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

**1.2 RELATED WORK**

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-resistant rated construction.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 FACTORY TESTS**

- A. Conductors and cables shall be thoroughly tested at the factory per NEMA to ensure that there are no electrical defects. Factory tests shall be certified. Existing conductors to be reused also to be tested per NEMA recommendations.

**1.5 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Submit the following data for approval:
      - 1) Electrical ratings and insulation type for each conductor and cable.
      - 2) Splicing materials and pulling lubricant.

2. Certifications: Two weeks prior to final inspection, submit the following.
  - a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

#### 1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.
- B. American Society of Testing Material (ASTM):
  - D2301-10 .....Standard Specification for Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape
  - D2304-10 .....Test Method for Thermal Endurance of Rigid  
Electrical Insulating Materials
  - D3005-10 .....Low-Temperature Resistant Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape
- C. National Electrical Manufacturers Association (NEMA):
  - WC 70-09 .....Power Cables Rated 2000 Volts or Less for the  
Distribution of Electrical Energy
- D. National Fire Protection Association (NFPA):
  - 70-11 .....National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
  - 44-10 .....Thermoset-Insulated Wires and Cables
  - 83-08 .....Thermoplastic-Insulated Wires and Cables
  - 467-07 .....Grounding and Bonding Equipment
  - 486A-486B-03 .....Wire Connectors
  - 486C-04 .....Splicing Wire Connectors
  - 486D-05 .....Sealed Wire Connector Systems
  - 486E-09 .....Equipment Wiring Terminals for Use with  
Aluminum and/or Copper Conductors

- 493-07 .....Thermoplastic-Insulated Underground Feeder and  
Branch Circuit Cables  
514B-04 .....Conduit, Tubing, and Cable Fittings

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS AND CABLES

- A. Conductors and cables shall be in accordance with NEMA, UL, as specified herein, and as shown on the drawings.
- B. All conductors shall be copper.
- C. Single Conductor and Cable:
1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
  2. No. 8 AWG and larger: Stranded.
  3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
  4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.
- D. Color Code:
1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
  2. No. 8 AWG and larger: Color-coded using one of the following methods:
    - a. Solid color insulation or solid color coating.
    - b. Stripes, bands, or hash marks of color specified.
    - c. Color using 19 mm (0.75 inches) wide tape.
  3. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
  4. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

5. Lighting circuit "switch legs", and 3-way and 4-way switch "traveling wires," shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated

- above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COTR.
6. Color code for isolated power system wiring shall be in accordance with the NEC.

## **2.2 SPLICES**

- A. Splices shall be in accordance with NEC and UL.
- B. Above Ground Splices for No. 10 AWG and Smaller:
1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
  2. The integral insulator shall have a skirt to completely cover the stripped conductors.
  3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.
- C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:
1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
  2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
  3. Splice and insulation shall be product of the same manufacturer.
  4. All bolts, nuts, and washers used with splices shall be zinc-plated steel.
- D. Above Ground Splices for 250 kcmil and Larger:
1. Long barrel "butt-splice" or "sleeve" type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
  2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
  3. Splice and insulation shall be product of the same manufacturer.
- E. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

## **2.3 CONNECTORS AND TERMINATIONS**

- A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
- B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
- C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated steel.

## **2.4 CONTROL WIRING**

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

## **2.5 WIRE LUBRICATING COMPOUND**

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.
- B. Shall not be used on conductors for isolated power systems.

# **PART 3 - EXECUTION**

## **3.1 GENERAL**

- A. Install conductors in accordance with the NEC, as specified, and as shown on the drawings.
- B. Install all conductors in raceway systems.
- C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.
- D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.



- G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.
- H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.
- I. Conductor and Cable Pulling:
  - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
  - 2. Use nonmetallic pull ropes.
  - 3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
  - 4. All conductors in a single conduit shall be pulled simultaneously.
  - 5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- J. No more than three branch circuits shall be installed in any one conduit.
- K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

### **3.2 SPLICE AND TERMINATION INSTALLATION**

- A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

### **3.3 CONDUCTOR IDENTIFICATION**

- A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

### 3.4 FEEDER CONDUCTOR IDENTIFICATION

- A. In each interior pullbox and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

### 3.5 EXISTING CONDUCTORS

- A. Unless specifically indicated on the plans, existing conductors shall not be reused. Test all existing conductors prior to placing in service.

### 3.6 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
1. Visual Inspection and Tests: Inspect physical condition.
  2. Electrical tests:
    - a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
    - b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
    - c. Perform phase rotation test on all three-phase circuits.

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**SECTION 26 05 26**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.
- B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.
- D. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low-voltage transformers.
- E. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
  - 2. Test Reports:
    - a. Two weeks prior to the final inspection, submit ground resistance field test reports to the COTR.
  - 3. Certifications:

- a. Certification by the Contractor that the grounding equipment has been properly installed and tested.

## 1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Society for Testing and Materials (ASTM):
  - B1-07 .....Standard Specification for Hard-Drawn Copper Wire
  - B3-07 .....Standard Specification for Soft or Annealed Copper Wire
  - B8-11 .....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - 81-83 .....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements
- D. National Fire Protection Association (NFPA):
  - 70-11 .....National Electrical Code (NEC)
  - 70E-12 .....National Electrical Safety Code
  - 99-12 .....Health Care Facilities
- E. Underwriters Laboratories, Inc. (UL):
  - 44-10 .....Thermoset-Insulated Wires and Cables
  - 83-08 .....Thermoplastic-Insulated Wires and Cables
  - 467-07 .....Grounding and Bonding Equipment

## PART 2 - PRODUCTS

### 2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.
- B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors

shall be stranded for final connection to motors, transformers, and vibrating equipment.

- C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.
- D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

## **2.2 GROUND CONNECTIONS**

### **A. Above Grade:**

- 1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
- 2. Connection to Building Steel: Exothermic-welded type connectors.
- 3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
- 4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

## **2.3 EQUIPMENT RACK AND CABINET GROUND BARS**

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

## **2.4 GROUND TERMINAL BLOCKS**

- A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Install grounding equipment in accordance with the NEC, as shown on the drawings, and as specified herein.
- B. System Grounding:
  - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.
  - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

### **3.2 INACCESSIBLE GROUNDING CONNECTIONS**

- A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

### **3.3 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS**

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
  - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
  - 2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.
- C. Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:
  - 1. Connect the equipment grounding conductors to the ground bus.
  - 2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.
- D. Transformers:

1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system.

### **3.4 RACEWAY**

#### **A. Conduit Systems:**

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

#### **B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.**

#### **C. Boxes, Cabinets, Enclosures, and Panelboards:**

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

#### **D. Wireway Systems:**

1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6



- AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).
  3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
  4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).
- E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.
- F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- H. Raised Floors: Provide bonding for all raised floor components as shown on the drawings.
- I. Panelboard Bonding in Patient Care Areas: The equipment grounding terminal buses of the normal and essential branch circuit panel boards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than No. 10 AWG, installed in rigid metal conduit.

- - - END - - -

**SECTION 26 05 33  
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

**1.2 RELATED WORK**

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.
- B. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.
- C. Section 09 91 00, PAINTING: Identification and painting of conduit and other devices.
- D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Manufacturer's Literature and Data: Showing each cable type and rating. The specific item proposed and its area of application shall be identified on the catalog cuts.
- C. Shop Drawings:
  - 1. Size and location of main feeders.
  - 2. Size and location of panels and pull-boxes.
  - 3. Layout of required conduit penetrations through structural elements.

D. Certifications:

1. Two weeks prior to the final inspection, submit four copies of the following certifications to the COTR:
  - a. Certification by the manufacturer that the material conforms to the requirements of the drawings and specifications.
  - b. Certification by the contractor that the material has been properly installed.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American National Standards Institute (ANSI):
  - C80.1-05 .....Electrical Rigid Steel Conduit
  - C80.3-05 .....Steel Electrical Metal Tubing
  - C80.6-05 .....Electrical Intermediate Metal Conduit
- C. National Fire Protection Association (NFPA):
  - 70-08 .....National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
  - 1-05 .....Flexible Metal Conduit
  - 5-04 .....Surface Metal Raceway and Fittings
  - 6-07 .....Electrical Rigid Metal Conduit - Steel
  - 50-95 .....Enclosures for Electrical Equipment
  - 360-093 .....Liquid-Tight Flexible Steel Conduit
  - 467-07 .....Grounding and Bonding Equipment
  - 514A-04 .....Metallic Outlet Boxes
  - 514B-04 .....Conduit, Tubing, and Cable Fittings
  - 514C-96 .....Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
  - 651-05 .....Schedule 40 and 80 Rigid PVC Conduit and Fittings
  - 651A-00 .....Type EB and A Rigid PVC Conduit and HDPE Conduit
  - 797-07 .....Electrical Metallic Tubing
  - 1242-06 .....Electrical Intermediate Metal Conduit - Steel
- E. National Electrical Manufacturers Association (NEMA):
  - TC-2-03 .....Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
  - TC-3-04 .....PVC Fittings for Use with Rigid PVC Conduit and Tubing

FB1-07 .....Fittings, Cast Metal Boxes and Conduit Bodies  
for Conduit, Electrical Metallic Tubing and  
Cable

## **PART 2 - PRODUCTS**

### **2.1 MATERIAL**

- A. Conduit Size: In accordance with the NEC, but not less than 0.5 in [13 mm] unless otherwise shown. Where permitted by the NEC, 0.5 in [13 mm] flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
  - 1. Rigid steel: Shall conform to UL 6 and ANSI C80.1.
  - 2. Rigid intermediate steel conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
  - 3. Electrical metallic tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 4 in [105 mm] and shall be permitted only with cable rated 600 V or less.
  - 4. Flexible galvanized steel conduit: Shall conform to UL 1.
  - 5. Liquid-tight flexible metal conduit: Shall conform to UL 360.
  - 6. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
  - 7. Surface metal raceway: Shall conform to UL 5.
- C. Conduit Fittings:
  - 1. Rigid steel and IMC conduit fittings:
    - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
    - b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
    - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
    - d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
    - e. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat

in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.

- f. Sealing fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

2. Electrical metallic tubing fittings:

- a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
- b. Only steel or malleable iron materials are acceptable.
- c. Compression couplings and connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
- d. Indent-type connectors or couplings are prohibited.
- e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.

3. Flexible steel conduit fittings:

- a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
- b. Clamp-type, with insulated throat.

4. Surface metal raceway fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.

D. Conduit Supports:

- 1. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
- 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod. Reuse existing where available.
- 3. Multiple conduit (trapeze) hangers: Not less than 1.5 x 1.5 in [38 mm x 38 mm], 12-gauge steel, cold-formed, lipped channels; with not less than 0.375 in [9 mm] diameter steel hanger rods.
- 4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Junction, and Pull Boxes:

- 1. UL-50 and UL-514A.
- 2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.

3. Sheet metal boxes: Galvanized steel, except where otherwise shown.
  4. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- F. Wireways: Equip with hinged covers, except where removable covers are shown. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

### **PART 3 - EXECUTION**

#### **3.1 PENETRATIONS**

- A. Cutting or Holes:
1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the COTR prior to drilling through structural elements.
  2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except where permitted by the COTR as required by limited working space.
- B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

#### **3.2 INSTALLATION, GENERAL**

- A. In accordance with UL, NEC, as shown, and as specified herein.
- B. Essential (Emergency) raceway systems shall be entirely independent of other raceway systems, except where shown on drawings.
- C. Install conduit as follows:
1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
  2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings, except in the electrical and elevator machine rooms.
  3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.

4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 8 ft [2.4 M] on centers. Do not use other supports, i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts. Using existing conduit supports in the area is acceptable if space is available.
7. Support within 12 in [300 mm] of changes of direction, and within 12 in [300 mm] of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
9. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
10. Conduit bodies shall only be used for changes in direction, and shall not contain splices.

D. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the COTR.

### 3.3 CONCEALED WORK INSTALLATION

A. Above Furred or Suspended Ceilings and in Walls:

1. Conduit for conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the same system is prohibited.
2. Conduit for conductors 600 V and below: Rigid steel, IMC, or EMT. Mixing different types of conduits indiscriminately in the same system is prohibited.

3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 6 ft [1.8 M] of flexible metal conduit extending from a junction box to the fixture.
5. Tightening setscrews with pliers is prohibited.

### **3.4 EXPOSED WORK INSTALLATION**

- A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Conduit for Conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the system is prohibited.
- C. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits indiscriminately in the system is prohibited.
- D. Align and run conduit parallel or perpendicular to the building lines.
- E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- F. Support horizontal or vertical runs at not over 8 ft [2.4 M] intervals.
- G. Surface metal raceways: Use only where shown.
- H. Painting:
  1. Paint exposed Fire Alarm conduit red.
  2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 2 in [50 mm] high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 20 ft [6 M] intervals in between.

### **3.5 MOTORS AND VIBRATING EQUIPMENT**

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water. Provide a green equipment grounding conductor with flexible metal conduit.



### 3.6 EXPANSION JOINTS

- A. Conduits 3 in [75 mm] and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
- B. Provide conduits smaller than 3 in [75 mm] with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5 in [125 mm] vertical drop midway between the ends. Flexible conduit shall have a bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for conduits 15 in [375 mm] and larger are acceptable.
- C. Install expansion and deflection couplings where shown.
- D. Seismic Areas: In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 in [375 mm] of slack flexible conduit. Flexible conduit shall have a copper green ground bonding jumper installed.

### 3.7 CONDUIT SUPPORTS, INSTALLATION

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 lbs [90 kg]. Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
  - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
  - 2. Existing Construction:
    - a. Steel expansion anchors not less than 0.25 in [6 mm] bolt size and not less than 1.125 in [28 mm] embedment.
    - b. Power set fasteners not less than 0.25 in [6 mm] diameter with depth of penetration not less than 3 in [75 mm].
    - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.

- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- I. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- J. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- K. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

### 3.8 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
  - 1. Flush-mounted.
  - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 in [100 mm] square x 2.125 in [55 mm] deep, with device covers for the wall material and thickness involved.
- E. On all branch circuit junction box covers, identify the circuits with black marker.

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**SECTION 26 24 16**  
**PANELBOARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of panelboards.

**1.2 RELATED WORK**

- A. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Requirements for seismic restraint of non-structural components.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
1. Shop Drawings:
- a. Submit sufficient information to demonstrate compliance with drawings and specifications.
  - b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.
  - c. Certification from the manufacturer that a representative panelboard has been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

2. Manuals:

- a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.
  - 1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.
  - 2) Include information for testing, repair, troubleshooting, assembly, and disassembly.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.

- a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.
- b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):  
IBC-12 .....International Building Code
- C. National Electrical Manufacturers Association (NEMA):  
PB 1-11 .....Panelboards  
250-08 .....Enclosures for Electrical Equipment (1,000V  
Maximum)
- D. National Fire Protection Association (NFPA):  
70-11 .....National Electrical Code (NEC)  
70E-12 .....Standard for Electrical Safety in the Workplace
- E. Underwriters Laboratories, Inc. (UL):  
50-95 .....Enclosures for Electrical Equipment  
67-09 .....Panelboards

489-09 .....Molded Case Circuit Breakers and Circuit  
Breaker Enclosures

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS**

- A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.
- B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.
- C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.
- D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.
- E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.
- F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.
- G. Neutral bus shall be 100% rated, mounted on insulated supports.
- H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.
- I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.
- J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.
- K. Series-rated panelboards are not permitted.

**2.2 ENCLOSURES AND TRIMS**

- A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

1. Hinged "door-in-door" type.
2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
4. Inner and outer doors shall open left to right.
5. Trims shall be flush or surface type as shown on the drawings.

**2.3 MOLDED CASE CIRCUIT BREAKERS**

- A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.
- B. Circuit breakers shall be bolt-on type.
- C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:
  1. 120/208 V Panelboard: 10,000 A symmetrical.
  2. 120/240 V Panelboard: 10,000 A symmetrical.
  3. 277/480 V Panelboard: 14,000 A symmetrical.
- D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.

E. Circuit breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.
10. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory accordingly.

**2.4 SURGE PROTECTIVE DEVICES**

- A. Where shown on the drawings, furnish panelboards with integral surge protective devices. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected.
- C. Install a printed schedule of circuits in each panelboard after approval by the COTR. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards
- D. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).



- E. Provide blank cover for each unused circuit breaker mounting space.

### **3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
  - 1. Visual Inspection and Tests:
    - a. Compare equipment nameplate data with specifications and approved shop drawings.
    - b. Inspect physical, electrical, and mechanical condition.
    - c. Verify appropriate anchorage and required area clearances.
    - d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
    - e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
    - f. Vacuum-clean enclosure interior. Clean enclosure exterior.

### **3.3 FOLLOW-UP VERIFICATION**

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

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**SECTION 26 27 26**  
**WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of wiring devices.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.
- C. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Include electrical ratings, dimensions, mounting details, construction materials, grade, and termination information.
  2. Manuals:
    - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and information for ordering replacement parts.
    - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.
  - a. Certification by the manufacturer that the wiring devices conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the wiring devices have been properly installed and adjusted.

#### 1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. National Fire Protection Association (NFPA):
  - 70-11 .....National Electrical Code (NEC)
  - 99-12 .....Health Care Facilities
- C. National Electrical Manufacturers Association (NEMA):
  - WD 1-10 .....General Color Requirements for Wiring Devices
  - WD 6-08 .....Wiring Devices - Dimensional Specifications
- D. Underwriter's Laboratories, Inc. (UL):
  - 5-11 .....Surface Metal Raceways and Fittings
  - 20-10 .....General-Use Snap Switches
  - 231-07 .....Power Outlets
  - 467-07 .....Grounding and Bonding Equipment
  - 498-07 .....Attachment Plugs and Receptacles
  - 943-11 .....Ground-Fault Circuit-Interrupters
  - 1449-07 .....Surge Protective Devices
  - 1472-96 .....Solid State Dimming Controls

### PART 2 - PRODUCTS

#### 2.1 RECEPTACLES

- A. General: All receptacles shall comply with NEMA, NFPA, UL, and as shown on the drawings.
  1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
  2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.

- B. Duplex Receptacles: Hospital-grade, single phase, 20 ampere, 120 volts, 2-pole, 3-wire, NEMA 5-20R, with break-off feature for two-circuit operation.
  - 1. Bodies shall be ivory, or match existing in color.
  - 2. Duplex Receptacles on Emergency Circuit:
    - a. In rooms without emergency powered general lighting, the emergency receptacles shall be of the self-illuminated type.
  - 3. Duplex Receptacles (not hospital grade): Shall be the same as hospital grade duplex receptacles except for the hospital grade listing and as follows.
    - a. Bodies shall be brown, or match existing nylon.
- C. Receptacles; 20, 30, and 50 ampere, 250 Volts: Shall be complete with appropriate cord grip plug.

## **2.2 TOGGLE SWITCHES**

- A. Toggle switches shall be totally enclosed tumbler type with nylon bodies. Handles shall be ivory, or match existing in color unless otherwise specified or shown on the drawings.
  - 1. Switches installed in hazardous areas shall be explosion-proof type in accordance with the NEC and as shown on the drawings.
  - 2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off fasteners ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
  - 3. Switches shall be rated 20 amperes at 120-277 Volts AC.

## **2.3 WALL PLATES**

- A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates are not acceptable.
- B. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- C. In areas requiring tamperproof wiring devices, wall plates shall be type 302 stainless steel, and shall have tamperproof screws and beveled edges.

## **2.4 SURFACE MULTIPLE-OUTLET ASSEMBLIES**

- A. Shall have the following features:
  - 1. Enclosures:

- a. Thickness of steel shall be not less than 1 mm (0.040 inch) for base and cover. Nominal dimensions shall be 40 mm x 70 mm (1-1/2 inches by 2-3/4 inches) with inside cross sectional area not less than 2250 square mm (3-1/2 square inches). The enclosures shall be thoroughly cleaned, phosphatized, and painted at the factory with primer and the manufacturer's standard baked enamel finish.
2. Receptacles shall be duplex, hospital grade. See paragraph 'RECEPTACLES' in this Section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
3. Unless otherwise shown on drawings, receptacle spacing shall be 600 mm (24 inches) on centers.
4. Conductors shall be as specified in Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE.
5. Installation fittings shall be the manufacturer's standard bends, offsets, device brackets, inside couplings, wire clips, elbows, and other components as required for a complete system.
6. Bond the assemblies to the branch circuit conduit system.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Install wiring devices after wall construction and painting is complete.
- C. The ground terminal of each wiring device shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the branch circuit equipment grounding conductor.
- D. Outlet boxes for toggle switches and manual dimming controls shall be mounted on the strike side of doors.
- E. Provide barriers in multigang outlet boxes to comply with the NEC.
- F. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.

- G. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades.
- H. Install wall switches 1.2 M (48 inches) above floor, with the toggle OFF position down.
- I. Install wall dimmers 1.2 M (48 inches) above floor.
- J. Install receptacles 450 mm (18 inches) above floor, and 152 mm (6 inches) above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.
- K. Install vertically mounted receptacles with the ground pin up. Install horizontally mounted receptacles with the ground pin to the right.
- L. When required or recommended by the manufacturer, use a torque screwdriver. Tighten unused terminal screws.
- M. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.

### 3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform manufacturer's required field checks in accordance with the manufacturer's recommendations. In addition, include the following:
  - 1. Visual Inspection and Tests:
    - a. Inspect physical and electrical condition.
    - b. Vacuum-clean surface metal raceway interior. Clean metal raceway exterior.
    - c. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
    - d. Test GFCI receptacles.
  - 2. Healthcare Occupancy Tests:
    - a. Test hospital grade receptacles for retention force per NFPA 99.

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