

PROJECT

SPICIFICATIONS FOR:

BUILDING 5B3

ELECTRICIAL REWORK

DIVISION 00 - SPECIAL SECTIONS

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DIVISION 01 - GENERAL REQUIREMENTS

**SECTION 01 00 00
GENERAL REQUIREMENTS**

1.1 GENERAL INTENTION

- A. Contractor shall provide all labor and materials to remove part of newly install sub panel system and install new sub panel system. The contractor shall provide all labor, equipment and materials to complete that contract requirements
- B. Visits to the site by Bidders may be made only by appointment with the Contracting Officer.
- C. 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.
- D. 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.
- E. Training:
 - 1. All employees of general contractor or subcontractors shall have the 10-hour or 30-hour OSHA Construction Safety course and 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. ITEM I,

STATEMENT OF WORK:

1. Provide design service by an Electrical Engineer licensed in the State of California to create plans and material specifications for the installation of additional electrical service to the work site.
2. All installation work shall conform to sections; 26 05 11 Requirements for Electrical Installation and 26 05 21 Low-Voltage Electrical Power Conductors, Cables (600 Volts and below) of the contract and National Electric Code 2008, NFPA 70.
3. Design to include but not limited to providing a 100 AMP 120/208VAC 3 phase power feed from panel "Distr. Panel L-2" in room 5B116 the electrical Dist room in build 5 thru a conduit that connects to the existing conduit that leads to the new 120/240 VAC panel on floor 3 installed in Project 64-12 108P.
4. Remove existing 120/240 sub panel, locate new 100 AMP 120/208 3 phase sub panel in the hallway to the left of the existing third floor distribution closet. Fill and paint any plaster holes left by conduit installation and removal of the existing panel. This work is to be accomplished during off work hours.
5. All Conduit couplings are to be of the compression type. Replace any couplings as needed to comply.
6. Reroute any circuits on existing 120/240 VAC panel to new 100 AMP 3 phase 120/208 VAC panel.
7. Work include removing a newly installed 120/240 VAC sub panel, transformer and related material. Reuse to the maximum possible any equipment, wire, and conduits already in place.
8. Provide the service of a journeyman electrician(s) to install the contractor's, electrical engineer, designed electrical distribution system. Provide all materials required to install the system. Provide all tools and equipment required to install the system.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

NOT USED

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 General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.
3. The contractor shall submit their SECURITY PLAN. The SECURITY PLAN shall be submitted within 10 day of the contract award. The Notice To Proceed (NTP) will not be issued until the SECURITY PLAN is approved. This requirement is waived.

B. Security Procedures:

1. Worksites locate within occupied buildings will be locked at all times. Install a passage way lockset that will receive a "Best" lock core. The lock core will installed by the VAPA. The VAPA will provide as many keys as requested by the contractor. As an alternate the contractor may install a cipher lock, this lock must be capable of being opened with a "Best" lock key. The lock core will be installed by the VAPA.
 - a. All keys shall be issued by the Construction Project Manager/ (COR) who is ultimately responsible for those keys.
2. General 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. Daily contractor identification badges are issued by the VAPA Police department.
3. For working outside the "regular hours" as defined in the contract, The General Contractor shall give 3 work day's notice to the Construction Project Manager/COR so that security, escort, arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
4. No photography of VAPA premises is allowed without written permission of the Contracting Officer.
5. 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 General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Guards:

1. Not Used.

D. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the Construction Project Manager for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. The General 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. Security requirements addressing the destructions of records, drawings, and specifications by the Contractor shall be accomplished in accordance with VA Directive 6371 dated 02 May 2008.
2. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
3. The General 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 VAPA Police 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 General Contractor and its employees for parking in designated areas only.
- 3. Parking is VERY limited at the site the Contractor shall arrange to use VAPA off-site parking for contractor and subcontractor employees or otherwise coordinate parking with the Construction project Manager.

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 the Construction Project Manager who will

have the plan reviewed by the VAPA Safety Department for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. The Notice To Proceed (NTP) will not be issued until the FIRE SAFETY PLAN is approved. This requirement is waived.

- C. 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, VAPA safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAPA 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. See 1.4 Construction Security Requirements, B. Security Procedures for lock requirements.
 - 2. Install one-hour temporary construction partitions as shown on drawings or as required to separate the work site from the occupied portion of the building 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.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to the Construction Project Manager/COR.
- I. Fire Extinguishers: Provide, maintain and show proof of extinguisher maintenance at least one fire extinguisher per room 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.
- K. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers if required.
- L. 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 Construction Project Manager/COR. 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 Construction Project Manager/COR.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Construction Project manager/COR.
- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. VAPA Memorandum No. SAFE-09-6 Dated October 13, 2009 contains all Hot Work Permit requirements this is located in RULES

OF THE STATION. Obtain a Hot Work Permit from the SAFE Service.
Coordinate with the Construction Project Manager/COR.

- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Construction Project Manager/COR.
- P. 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.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily at the end of each work shift.
- R. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

1.5.1 CONSTRUCTION SAFETY REQUIREMENTS

A. OSHA

1. The contractor, all sub contractors, contractor visitors, suppliers delivering or any other person associated with the contractor that is on the construction site shall abide by all requirements of OSHA for the workplace.

2. All workers shall have the minimum OSHA 10.

3. A Competent Person with OSHA 30 training shall be on the construction site whenever work of any kind is being performed.

4. All Contractors, Sub, suppliers shall have current certification for equipment use, specialized training and current.

B. Unsafe Acts.

1. The Contracting Officer, Construction Project Manager/COR, The Director of VAPA, The Chief Engineer, the Director of Plans, any member of the VAPA Safety Office staff, Construction Inspector assigned to the project and Engineering Department Safety Officer has the authority to stop any unsafe act that they encounter.

The contractor shall correct any unsafe act stopped by VA staff. The contractor may not seek reimbursement of any costs associated with any unsafe act acts stopped by VA personnel.

2. VA will issue Safety violations to both General and sub-contractors whichever is causes the violation.

C. Safety Plan:

1. The safety plan defines both physical and administrative safety procedures that will remain effective for the entire duration of the project.
2. The General Contractor is responsible for assuring that all contractor and sub-contractors working on the project and their employees also comply with these regulations.
3. The contractor shall submit a SAFETY PLAN that is written specifically for this contract. The SAFTEY PLAN shall be submitted within 10 day of the contract award. The Notice To Proceed (NTP) shall not be issued until the SAFTEY PLAN is approved.
4. The SAFETY PLAN shall serve as reference document that any General contractor or sub-contractor employee can use to find the correct course of action in an emergency.
5. Site Safety Orientation is to be given to each sub contractor that is to be on site.

D. Safety Sign

1. All OSHA State and Fed posters must be posted at the entry or location on each project.
2. Have all current phone numbers of Superintendents posted and emergency numbers.
3. All Hot work permits must be posted on a daily bases when hot work is in process.

E. Certification

1. Many pieces of equipment and or tasks require that the person so doing must hold a certification card. Any personnel associated with the contractor who performs a task or used a piece of equipment that requires that person to hold certifying card must ensure that the card is update.

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. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The

temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

- C. 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. **(FAR 52.236-10)**
- D. Working space and space available for storing materials shall be as determined by the Construction Project Manager.
- E. Workmen are subject to rules of VAPA applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of VAPA 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, except for when authorized by the Construction Project Manager.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Provide unobstructed access to the VAPA areas required to remain in operation.
 - 3. Where access by VAPA 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.
- G. Not Used:
- I. Construction Fence: Before construction operations begin, Contractor shall provide a chain link construction fence, 2.1m (seven feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced

at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by Construction Project Manager/COR.

- J. When a building, or part of a building, is turned over to Contractor, Contractor shall accept entire responsibility therefore. This shall be the day of commencement of the NTP unless otherwise noted by the Contracting Officer. The contractor maintains this responsibility until the VA accepts the finished work after a Final Inspection from the contractor.
- K. Utilities Services: Maintain existing utility services for the VAPA 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 Construction Project Manager/COR.
 - 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 Construction Project Manager/COR. 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 VAPA Director's prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
 - 2. Contractor shall submit a request to interrupt any such services to Construction Project Manager/COR, in writing, 15 calendar days 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 the VAPA. Interruption time approved by VAPA 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 Construction Project Manager/COR.
 5. In case of a contract construction emergency, service will be interrupted on approval of Construction Project Manger/COR. 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.
- M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Construction Project Manager/COR.
- N. Coordinate the work for this contract with other construction operations as directed by Construction Project Manager/COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.
- 1.7 ALTERATIONS: THIS REQUIREMENT IS WAIVED.**
- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Construction Project Manager/COR and a representative of VA Facilities, of areas 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 Construction Project Manager/COR.
- 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 Construction Project Manager/COR, 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 Construction Project Manager/COR 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 VAPA'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 and indicated on the drawings. Prior to start of work, prepare a INFECTIOUS PREVENTION PLAN detailing project-specific dust protection measures, including periodic status reports, and submit to the Construction Project Manager and Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. The Notice To Proceed (NTP) will not be issued until the INFECTIOUS PREVENTION PLAN is approved. This requirement is waived.
 1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the VAPA.
- C. VAPA 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 Construction Project Manager/COR 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. The contractor shall install negative air machines as directed by the Construction Project Manager and shall be required to add machines as directed.
2. In case of any problem, the VAPA, 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 Construction Project Manager/COR. For construction in any areas that will remain jointly occupied by the VAPA and Contractor's workers, the Contractor shall:
 - a. Provide dust proof temporary drywall construction barriers to completely separate construction from the operational areas of the hospital in order to contain dirt debris and dust. Construct the dust proof barrier with a one hour fire rating. 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 in certain circumstances where hard walls cannot be constructed and an agreement is reached with the Construction Project Manager/COR and VAPA Fire Protection Specialist.
 - b. HEPA filtration is required. 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 VAPA.

- c. The contractor shall install a state of the art air pressure differential monitor. The monitor shall be placed at such a location that anyone entering or leaving the work site shall be able to determine if negative air pressure is being maintained.
- d. 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. A Shop Vac with HEPA filtration shall be placed at any exit from the work site. These Shop Vac's shall be used to remove dust that has accumulated on workers clothing while working whenever they leave the work site. These mats shall be changed as often by the as directed Construction Project Manager/COR to maintain clean work areas directly outside construction area at all times.
- e. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Shop Vac's and Vacuum cleaners 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.
- f. The contractor shall not haul debris through patient-care areas without prior approval of the Construction Project Manager/COR and the VAPA. 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 wheel treads and 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. Wheels and tires shall not track debris on floors outside the work zone.
- g. 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.

- h. 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 4 hours. Remove and dispose of porous materials that remain damp for more than 24 hours.
 - i. 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 each phase of the 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 including above ceiling spaces. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
 - 3. All existing and new air ducts subject to dust from the construction activity 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 were directed by Construction Project Manager.
 - 2. Items not reserved shall become property of the Contractor and be removed by Contractor from the VAPA.
 - 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 Engineer.
- 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 CRR 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
5. Lead based paint found but not identified by the government shall not be disturbed. Notify the Construction Project Manager/COR immediately and await further instructions.

6. Asbestos or asbestos containing material found but not identified by the government shall not be disturbed. Notify the Construction Project Manager/COR immediately and await further instructions.
7. Other hazardous material if found but not identified by the government shall not be disturbed. Notify the Construction Project Manager/COR immediately and await further instructions.

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

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) 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.

D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. If a National Pollutant Discharge Elimination System (NPDES) permit is required for this project. The Contractor is considered an "operator" under the permit and has extensive responsibility for compliance with permit requirements. VA will make the permit application available at the (appropriate medical center) office. The contractor and affected subcontractors shall furnish all information and certifications that are required to comply with the permit process and permit requirements. Many of the permit requirements will be satisfied by completing construction as shown and specified. Some requirements involve the Contractor's method of operations and operations planning and the Contractor is responsible for employing best management practices. The affected activities often include, but are not limited to the following:

- Designating areas for equipment maintenance and repair;
- Providing waste receptacles at convenient locations and provide regular collection of wastes;
- Locating equipment wash down areas on site, and provide appropriate control of wash-waters;
- Providing protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic materials; and
- Providing adequately maintained sanitary facilities.

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 Construction Project Manager/COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Construction Project manager/COR 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 WORK HOURS

- A. All work is to be performed between the hours of **8:00AM** and **5:30PM**.
- B. Any work outside of these hours shall be requested in writing to the Construction Project Manager/COR. Work outside of these hours is governed by utility shut down requirements or other applicable VAPA rules. If no other requirements are applicable then 5 working days notice is required.
- C. If the Contractor needs to perform work during hours other than the hours stated in paragraph 1.12 WORK HOURS, the Contractor shall submit a written request Seven (7) Calendar Days prior to required start of work. The request shall include number of work days, work hours, elements, labor categories, and VA Master Specifications Construction Division Number, also starting times, ending times, and overall dates of proposed work. Work may begin during requested times only after approval of the request by the Contracting Officer.
- D. The following Federal Holidays are observed and nor work shall take place on these days without written permission of the Contracting Officer:

FEDERAL HOLIDAYS ARE:

New Year's Day

Labor Day

Martin Luther King Day

Columbus Day

Presidents' Day	Veterans' Day
Memorial Day	Thanksgiving
Independence Day	Christmas

Also included would be any other day specifically declared by the President of the United States of America to be a National Holiday.

1.13 PIPE FREEZING IN LEW OF UTILITY SHUT DOWN

- A. The contractor shall whenever possible isolate water services via the commercial process known as pipe freezing. This shall not require the attendance of VAPA shop personnel.
- B. Isolation valves shall be installed whenever the freezing process is used.
- C. All personnel involved in the pipe freezing process shall have proof of training in this method.

1.14 LAYOUT OF WORK

- A. The Contractor shall lay out the work from Government established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The VAPA is not responsible for confirming any layout required within this contract. This applies to new construction and change of use of existing buildings. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor. **(FAR 52.236-17)**
- B. Establish and plainly mark center lines for each building and/or addition to each existing building and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such structure and/or addition, roads, parking lots are in accordance with lines and elevations shown on contract drawings.

- C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:
1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Resident Engineer before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.
- D. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the Construction Project Manager/COR before any major items of concrete work are placed. In addition, Contractor shall also furnish to the Construction Project Manager/COR certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
1. Lines of each building and/or addition.
 2. Elevations of bottoms of footings and tops of floors of each building and/or addition.
 3. Lines and elevations of sewers and of all outside distribution systems.
 4. Lines and elevations of roads, streets and parking lots.
- E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to Construction Project Manager/COR.
- F. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.15 AS-BUILT DRAWINGS

NOTE: The contractor shall use a set of drawings from project 640 13 108P to provide as built information for this project.

- A. The contractor shall maintain two full size sets of as-built drawings on the job site 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 Construction Project Manager's/COR's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built, marked up in RED of original drawings to the Construction Project Manager/COR within 15 calendar days after each completed phase (if the project is phased) and after the acceptance of the project by the Construction Project Manager/COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings, manuals and other contract required documents.
- E. Final payment shall not be made before receipt of all as built drawings, manuals and other contract documentation by the Construction Project Manager/COR.

1.16 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the Construction Project Manager, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.
- B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.
- C. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.17 RESIDENT ENGINEERS FIELD OFFICE

A. NOT USED.

1.18 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 Construction Project Manager/COR. If the equipment is not installed and maintained in accordance with the following provisions, the Construction Project Manager/COR 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.
 6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feed water heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating

- personnel. Boiler water must be given complete and continuous chemical treatment.
- B. Prior to final inspection, all equipment used by the contractor shall be inspected by the Construction Project Manager/COR, equipment or parts used which show wear and tear beyond normal, as determined by the Construction Project Manager/COR, 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.

1.19 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 Construction Project Manager/COR for use of elevators. The Construction Project Manager/COR shall ascertain that elevators are in proper condition. Contractor shall use elevator Nos. 6 in Building 100 for moving all debris, materials, tools and equipment. All other elevators may be used for the transportation of personnel only. 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.
 3. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes.
 4. If brake lining of elevators are excessively worn or damaged during temporary use, they shall be removed and replaced by new brake lining.
 5. All parts of main controller, starter, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced

with new parts, if recommended by elevator inspector after elevator is released by Contractor.

6. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by Contracting Officer.

1.20 NOT USED

- A. NOT USED.

1.21 TEMPORARY TOILETS

- A. Contractor may have for the use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by the VAPA. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workmen. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.
- B. When toilet accommodations are not available the contractor shall provide portable toilets.

1.22 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 furnished without charge.
- B. Heat: If needed furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
 1. Obtain heat by connecting to VAPA heating distribution system.
 - a. Steam is available at no cost to Contractor.
- C. Electricity (for Construction and Testing): If needed furnish all temporary electric services.
 1. Obtain electricity by connecting to the VAPA electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

- D. Water (for Construction and Testing): If needed furnish temporary water service.
1. Obtain water by connecting to the VAPA water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at Construction Project Manager's/COR's discretion) of use of water from VAPA's system. Any damage due to water leaks shall be repaired at the contractor's expense.
- E. Steam: If needed furnish steam system for testing required in various sections of specifications.
1. Obtain steam for testing by connecting to the VAPA steam distribution system. Steam is available at no cost to the Contractor.
 2. Maintain connections, pipe, fittings and fixtures and conserve steam use so none is wasted. Failure to stop leakage or other waste will be cause for revocation (at Construction Project Manager's/COR's discretion), of use of steam from the VAPA's system.
- F. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished by the Contractor at Contractor's expense. The use of these products is restricted to the boiler building only.

1.23 NEW TELEPHONE AND DATA EQUIPMENT

If the contract does not require the contractor to install telephone and data equipment the contractor shall coordinate with the work of installation of telephone and data equipment by others. This work shall be completed before the building is turned over to VAPA.

1.24 TESTS

- A. Pre test mechanical and electrical equipment and systems or other system installed as a result of this contract 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, feed water, 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.
- F. A report of each test performed containing at a minimum all testing results, readings taken and any recommendations by the testers shall be submitted to the Construction Project Manager/COR within 10 days of the completion of any test performed.

1.25 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 (two printed copies each and two on CD) for each separate piece of equipment shall be delivered to the Construction Project Manager/COR 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. The final payment will not be processed until all manuals are delivered to the Construction Project Manager/COR.
- D. 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 VAPA reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Construction Project Manager/COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.26 GOVERNMENT-FURNISHED PROPERTY

- A. The Government shall deliver to the Contractor, the Government-furnished property shown on specifications, schedule's and/or drawings.

- B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at VAPA.
- C. Notify Contracting Officer in writing, 60 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.
 - 1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Construction Project Manager/ COR with a written statement as to its condition or shortages.
 - 2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.
- D. Equipment furnished by the Government may or may not be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e., couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to make the connection between the Government furnished equipment item and the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.
- E. Completely assemble if required and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.
- F. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer or authorized distributor.

1.27 RELOCATED EQUIPMENT AND/OR ITEMS

- A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and/or items indicated by symbol "R" or otherwise shown to be relocated by the Contractor.
- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the Construction Project Manager.
- C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, whenever such lines

are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".

- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.
- E. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

1.28 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT

- A. Not Used.

1.29 CONSTRUCTION SIGN

- A. Not Used.

1.30 NOT USED.

1.31 PHOTOGRAPHIC DOCUMENTATION

- A. The contractor may find the need to photographically document existing conditions prior to working on some portion of the project or after the completion of a portion of the project. In addition the Construction Project Manager/COR may require the need to photographically document existing conditions prior to working on some portion of the project or after the completion of a portion of the project.
- B. The contractor shall use a digital camera or cell phone to take the required photograph(s).
- C. The contractor shall provide copies of documentation photographs taken when requested by the Construction Project Manager/COR. At the completion of the project the contractor shall provide copies of all documentation photographs taken of the project to the Construction Project manager/COR.
- D. All photograph(s) shall be provided on CD's. In the interest of expediency, the contractor may on occasion need to provide advance copies of the photograph's via e-mail to the Construction Project Manager

1.32 BRAND NAME OR EQUAL

- A. The RFP includes the "salient characteristics of the "or equal" aspect for determination of what is equal to any cited brand name. See

FAR 8.405-6(d) for "brand name or equal" information. This is an extremely long, detailed, and comprehensive RFP. Please note that, wherever a brand name is cited, contractor shall ensure, in any resultant contract, that any equal has the salient characteristics of the brand name. Lack of confirmation shall be grounds for Government inspection at any time and Government direction for replacement of materials or equipment by the Contractor at no increase in contract price or time.

1.33 HISTORICAL

A. Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the Resident Engineer verbally, and then with a written follow up.

1.34 SUBMITTAL LIST

A. Not Used.

1.35 CODES

- A. CONSTRUCTION CODES: These Codes and Regulations are required to be used for this contract. They supersede and / or are in addition to any codes or regulations used throughout this set of specifications:
- a. Building Code IBC - International Building Code 2009
 - b. Structural Code IBC - International Building Code 2009
 - c. Plumbing Code IPC - International Plumbing Code 2009
 - d. Mechanical Code IMC - International Mechanical code 2009
 - e. Electrical Code NEC - National Electric Code 2011,
NFPA 70
 - f. Hospital Code Health Care Facilities Code NFPA 99, 2012
 - g. Fire Code Fire/Life Safety Code, NFPA 101, 2012
 - h. Accessibility Code ICC/ANSI A117.1, 2003
 - i. Energy Code IECC - International Energy
Conservation Code 2003
 - j. Elevator Code ASME A17.1-3, ASME A18.1
Gas Code IFGC - International Fuel Gas Code 2009
 - k. NFPA 13
Installation of Sprinkler Systems 2013
 - l. NFPA 31
Installation of Oil Burning Equipment 2011
 - m. NFPA 80

Fire Doors and Other Opening Protectives

- n. NFPA 90A
Standards For the Installation of Air Conditioning and
Ventilation Systems 2012
- o. NFPA 96
Standards for Ventilation Control and Fire Protection

--END--

RULES OF THE STATION

VETERANS AFFAIRS PALO ALTO HEALTH CARE SYSTEM

The guidelines published in this issue are for the use and convenience of construction and maintenance contractors, vendors and others performing contract work at all Divisions of the VA Palo Alto Health Care System.

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- A. **CONTRACT WORK HOURS**. SEE SECTION 01 00 00 PART 1.12 WORK HOURS
- B. **UTILITIES**. No utility service such as water, gas, medical air and gas, steam, sewer, electric, fire protection or communication shall be interrupted without prior approval of the contact person. This includes those interruptions required by the contract. Construction contracts include provisions for maintaining utility systems or providing temporary facilities. Utility shutdowns shall be done on weekends. Requests for utility shutdowns shall reach the contact person at least 30 days before the scheduled work. Any EMERGENCY REQUIRING AN IMMEDIATE SHUTDOWN WILL BE REPORTED IMMEDIATELY to the contact person. The contact person will in turn immediately notify the Engineering Office and the appropriate Chief, Facilities and Operations. The Contractor will prepare and forward to the Chief, Engineering Service, a written report of the situation, why it happened, a schedule of any further corrective work needed, and what, if any steps are being taken to prevent a recurrence.

- C. **INTERIM LIFE SAFETY MEASURES.** If a Fire Alarm system is out of service for more than 4 hours, or if a Sprinkler system is out of service for more than 4 hours, then this shall require the contractor to implement Interim Life Safety Measures in accordance with the latest issue of the VA Palo Alto Health Care System Memorandum SAFE 07-23.
- D. **PROTECTIVE CLOTHING/EQUIPMENT.** All workers will wear and/or use protective clothing and gear when required. This includes hard hats, goggles, protective shoes, gloves, masks or breathing apparatus, etc. The Contractor shall provide and protective equipment that may be required.
- E. **TELEPHONES.** Contractors may provide their own telephone, or pay telephones are available at many locations throughout the VA Palo Alto Health Care System for public use including contractors and the contract workers. Government telephones will not be used for private business or personal calls. Contractors or their workers may use the Government telephones to call/page the contact person, the Engineering Service office, or when authorized by the contact person - to call their office concerning contract matters. Telephone calls for contract workers will not be accepted by the Health Care System.
- F. **ELEVATORS/CORRIDORS.** Contractors and workers may use corridors and elevators for travel to and from the job sites when in proper attire (shirt and shoes required) provided they don't track mud, wet cement or any form of "dirt" into the buildings. The contact person will assign specific routes, times and elevators to use for transportation of materials and equipment. The Contractor will clean-up any mess caused by their workmen. Smoking is prohibited in elevators and corridors. Elevators will not be used during an emergency.
- G. **TOILETS.** The Contractor is to provide their own toilet facilities, however, the contact person will advise the Contractor which toilet facilities (if available) may be used by the Contractor's workmen. The Contractor will ensure that the facilities are kept clean and will be responsible for any damage done by the Contractor's workers.
- H. **PARKING/TRAFFIC.** Specific parking areas may be assigned for workers on larger construction projects. Workers on smaller construction or maintenance contracts may use that is away from buildings if no parking area is designated. Contractors, including maintenance contractors and workers are specifically prohibited from parking in those spaces reserved for Engineering Vehicles or lawn areas. Further, the Contractor is not to "back in" the space.
- I. **DELIVERIES.** The contact person will assign routes for the delivery of materials and supplies to the job site. The Contractor or construction traffic will not block any Health Care System road or street, walk or building egress without requesting approval in a timely manner.
- J. **LOADING/UNLOADING.** Building loading docks and landings may be used to load or unload construction materials when approved by the contact person. However, any vehicle left unattended for more than a few minutes may be cited by the Health Care System Police. Some areas may be reserved for Health Care System operations only during certain hours.

- K. **FEDERAL POLICE.** The Health Care System Police are Federal Police Officers with full authority to make arrests, investigate crime, and to issue citations. Citations issued for driving, parking violations or other offenses usually require an appearance in the Federal District Court and/or payment of a fine. FOR THE SAFETY OF PATIENTS speed limits, other driving and parking codes are strictly enforced.
- L. **LOCKED AREAS.** The Contractor is to coordinate access to locked areas with the contact person, including obtaining keys required for access to work sites. All buildings at the Health Care System are locked during other than normal work hours. When the Contractor has approval to work other than normal work hours, he will need to make arrangements for his workers to have access to job sites.
- M. **OPERATIONS AND STORAGE AREAS** will be confined to areas designated by the contract or approved in writing by the contact person or the Contracting Officer. The Government will not be responsible for any tools, equipment or materials left or stored on Government facilities, unless exceptions are provided in the contract.
- N. **CONSTRUCTION WASTE AND DEBRIS** will not be disposed of on station or in Health Care System trash containers or dumpsters. The Contractor may provide his own bin or dumpster, however, the use and location of such must be approved in writing by the contract person. Construction waste and debris will not be accumulated in corridors or other building areas where it might cause a fire or safety hazard.
- O. **RECREATIONAL FACILITIES** such as swimming pools, gym, tennis courts, etc. Are not to be used by Contractors or Contractor's workers. Contractors and workers, in proper attire, are permitted to use the canteen for breaks and lunch and to purchase incidentals in the Canteen Store.
- P. **DISPOSAL OF HAZARDOUS MATERIALS.** Several buildings at the VAPAHCS contain asbestos containing materials (ACM). Some typical types of materials found to contain ACMs are pipe insulation, transit wall panels, floor tile, linoleum backing, floor/roof mastics and others. Contractors are required to communicate this information to all of their employees and subcontractors that will be working at any of the VAPAHCS sites, and failure to do so could result in OSHA citation(s). **Contractors are also required to alert the VAPAHCS immediately in the event any known or suspected ACM is accidentally disturbed or will need to be disturbed before proceeding with work.** If not indicated in the contract drawings, known locations of ACMs can be determined from the current VAPAHCS asbestos survey. Disposal of any hazardous or potentially hazardous materials in sanitary or storm sewer systems or on Health Care System grounds is strictly prohibited. Hazardous materials, such as asbestos materials, used cleaning solutions and other harmful chemicals shall be disposed of in accordance with State and/or local laws and regulations. In case of an accidental spill of hazardous materials, the contractor is expected to take immediate action to contain the spill and at the same time notify the C.O.T.R./Contracting Officer of the spill. Action should be taken to mitigate the situation until you receive direction from the VAPAHCS Quality Management personnel.

- Q. **WASH DOWN**. Washing leftover cement, plaster, paint, oil or grease, solvents, etc. into any drains and the washing down of cement trucks or other delivery vehicles is strictly prohibited. **REPORT ANY ACIDENTAL SPILLS THAT MAY RUN INTO STORN DRAINS IMMEDIATELY TO THE ENGINEERING SERVICE AT EXTENSION 62468.** Even accidental spills, particularly those not immediately controlled or contained, may result in legal action by local or state authorities against the responsible parties.
- R. **REMOVAL OF GOVERNMENT PROPERTY**, including empty boxes, crates, wood, etc. is prohibited, except approved by the Chief, Supply Service. Contractors or vendors taking Government equipment off station for repairs will notify the contact person of such action. In most cases, a receipt will be required.
- S. **SEXUAL HARASSMENT** is strictly prohibited. This includes deliberate or unsolicited verbal comments or gestures of a sexual nature, unwelcome sexual advances, requests for sexual favors and/or other unwelcome verbal or physical conduct of a sexual nature.
- T. **DRUGS AND ALCOHOL**. Possession or use of non-prescription drugs or alcohol, including beer and wine, on the Health Care System grounds is strictly prohibited.
- U. **FIREARMS AND EXPLOSIVES**. Possession of firearms, ammunitions, explosive devices and any hand held item that may be considered an offensive weapon is strictly prohibited. This includes carrying such items in vehicles.
- V. **SMOKING POLICY**. Smoking is prohibited in all Health Care System Buildings particularly in corridors, elevators, offices and patient areas, except in designated areas.
- W. **LOST AND FOUND**. Any article or money found on the premises should be delivered immediately to the contact person or the Health Care System Police for safekeeping. Anyone losing an article or money should contact the Health Care System Police to determine if it has been turned in.
- X. **SMOKE/FIRE BARRIER PENETRATIONS**. Any penetrations to smoke or fire barrier walls, ceiling or floor slabs shall be properly sealed immediately. We recommend Hilti Fire Stop 601 or 635 for walls and ceilings and Hilti Fire Stop 657 for floor penetrations.
- Y. **WELDING AND OR BURNING**: Any person planning welding, cutting metal studs or other such burning operations will obtain a burning permit from the Occupational Health and Safety Office, extension 65894. Welding and/or burning operations are allowed only during normal working hours.
- Z. **LOW VOLTAGE CABLE INSTALLATION**: The contractor shall install low voltage cable in raceways only after scheduling the work with the contact person. Whenever feasible, low voltage cables to be in the ceiling will be installed before the ceiling tile is installed.
- AA. **OCCUPATIONAL HEALTH AND SAFETY**: Contractors and their employees are expected to comply with and are subject to applicable OSHA and CAL-OSHA regulations as at any construction site.

- BB. **INJURY ACCIDENTS**: The Health Care System does not have the equipment, facilities, or personnel trained to handle serious injuries. Call 911 from a pay phone (or use an outside line) for emergency medical assistance and notify the contact person and the Health Care System Police.
- CC. **DAMAGE TO GOVERNMENT PROPERTY** caused by the Contractor or his workmen, whether accidental or incidental to the work, shall be corrected immediately at the Contractor's expense. This includes damage to lawns, shrubbery, irrigation systems, curbs, etc. Caused by construction vehicles/traffic and other operations.
- DD. **DUST AND FUME CONTROL** will be exercised on all construction operations. Workers will be careful not to operate any vehicles, gas or diesel engines, or to perform any fume or dust generating process near a building intake system.
- EE. **NOISE** will be held to a minimum at all times. Jack-hammering, core drilling and other noisy or disturbing operations may have to be rescheduled (or accomplished after hours) to avoid interfering with surgery or other programs. OSHA standards related to decibels are a requirement in any event.
- FF. **ROADS & WALKS**. Any debris dropped along egress from the station will be cleaned up immediately. Mud and dirt on roads and walks will be cleaned up as soon as the construction operation is complete or at the end of each day.
- GG. **FIRE SAFETY PRECAUTIONS** Contractors are expected to comply with all fire safety precautions. In the event of a fire or during regular fire drill, the contractor must vacate the construction site within the zone affected.

--- E N D ---

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SCHEDULE

PART 1

- 1.01 APPROVED SCHEDULE: Within 10 calendar days after award, submit a Ghant chart progress schedule. Once this schedule is reviewed and approved it becomes the APPROVED SCHEDULE. The Notice To Proceed (NTP) shall not be issued until there is an APPROVED SCHEDULE. The Ghant chart shall show the complete sequence of construction by activity (including acquisition of materials and equipment). The Ghant chart shall identify the construction start date, the completion date, and all workdays through the duration of the project, a period of time shall be included at the end of construction for completion of the project Punch List. Each work activity, sub activity and equipment delivery shall be shown. The APPROVED SCHEDULE shall be used by the contractor for planning, organizing, directing the work, reporting progress and requesting payment for work accomplished. The government shall use the APPROVED SCHEDULE to determine if the contractor is ahead or behind schedule. The APPROVED SCHEDULE can only be modified with the Contracting Officers approval.

The requirement for an APPROVED SCHEDULE in no way precludes the contractor from developing and using other types of schedules, net work analysis or other project planning tools to accomplish this contract. The Construction Project Manager/COR may at any time ask for any scheduling or planning document used by the contractor to be submitted.

- 1.02 SCHEDULE OF VALUES: Within 10 calendar days after the award, submit a schedule of values. Once this is reviewed and approved it will become the APPROVED SCHEDULE OF VALUES. This may be submitted in conjunction with the Ghant chart progress schedule. The Notice To Proceed (NTP) shall not be issued until there is an APPROVED SCHEDULE OF VALUES. There shall be a value provided for every work activity including materials and equipment on the APPROVED SCHEDULE. This shall total 80% of the award amount.

A brief description of each work activity shall be provided. This description shall provide enough information so as to determine what the work activity consists of so as to be able to determine when the work activity has been completed.

- 1.03 PERIODIC PAYMENTS: Periodic payments shall be approved only for work activities that have been 100% completed and for equipment and materials that has been delivered. Payments for General Conditions, 10% of the award amount, shall be divided by the number of months in the duration of the contract and paid as a percentage each month. A payment of 5% of the award amount shall be paid upon completion of the Final Inspection of Punch List items. The final payment shall be paid only after all as built drawings, manuals, any other required

documentation and the release of claims are delivered to the Construction Project Manager/COR.

- 1.04 MODIFICATIONS: If any contract modifications are made to this contract, the subject of the modification shall be treated as an additional work item. A revised Ghant chart schedule and schedule of values reflecting the modification shall be submitted for review and approval to become the new APPROVED SCHEDULE and APPROVED SCHEDULE OF VALUES. The new APPROVED SCHEDULE and APPROVED SCHEDULE OF VALUES and all subsequent documentation revering to them shall be clearly marked with "Revision #1", "Revision #2" and so on.

PART 2

Not Used.

PART 3

Not used.

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

PART 1-GENERAL

1.1 RELATED WORK

- A. 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 DEFINITIONS

- B. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, certificates, and manufacturers' literature and data shall also be subject to the referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1.3 SUBMITTAL PROCEDURES

- A. 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 equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
1. Satisfactory written evidence is presented to, and approved by Construction Project Manager/COR, that manufacturer cannot make scheduled delivery of approved item or;
 2. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 3. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- B. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure 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.

- C. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer or other competent party, and action thereon will be taken by Construction Project Manager/COR on behalf of the Contracting Officer.
- D. Upon receipt of submittals, Construction Project Manager/COR will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.
- E. The Government reserves the right to require additional submittals, whether or not particularly 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.
- F. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of the VAPA. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Construction Project Manager/COR, Architect-Engineer or other competent party assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- G. Submittals must be submitted by Contractor. All document submittals shall be E-Mailed to the Construction Project Manager/COR. Submittals of products shall be shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
 - 1. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates via E-MAIL to the Construction Project Manager/COR.
 - 2. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via E-MAIL, 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.

- a. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the VAPA, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
 - b. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- H. In addition to complying with the applicable requirements specified in preceding Paragraph G, 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 Construction Project Manager.
1. Laboratory shall furnish the Construction Project Manager 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 Contracting Officer's Representative/COR and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
 5. Laboratory test reports shall be sent directly to Contracting Officer's Representative/COR 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.
- I. 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" with a serial number in addition to containing other previously specified information required on label and in transmittal letter.
- J. Approved samples will be kept on file by the Construction Project Manager/COR 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.
- K. 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. ALL SUBMITTALS SHALL HAVE A UNIQUE SERIAL NUMBER FOR TRACKING.
 2. For each drawing required, the original .dwg and a PFD version shall be submitted via E-MAIL.
 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. One digital print of approved or disapproved shop drawings will be forwarded to Contractor.

6. When work is directly related and involves more than one trade, shop drawings shall be submitted to Construction Project Manager/COR under one cover.

L. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to the Construction Project Manager/COR.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

- - - E N D - - -

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)
811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Numbers: (202) 461-8217 or (202) 461-8292
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
<http://www.aabchq.com>

AAMA American Architectural Manufacturer's Association
<http://www.aamanet.org>

AAN American Nursery and Landscape Association
<http://www.anla.org>

AASHTO American Association of State Highway and Transportation Officials
<http://www.aashto.org>

AATCC American Association of Textile Chemists and Colorists
<http://www.aatcc.org>

ACGIH American Conference of Governmental Industrial Hygienists
<http://www.acgih.org>

ACI American Concrete Institute
<http://www.aci-int.net>

ACPA American Concrete Pipe Association
<http://www.concrete-pipe.org>

ACPPA American Concrete Pressure Pipe Association
<http://www.acppa.org>

ADC Air Diffusion Council
<http://flexibleduct.org>

AGA American Gas Association
<http://www.aga.org>

AGC Associated General Contractors of America
<http://www.agc.org>

AGMA American Gear Manufacturers Association, Inc.
<http://www.agma.org>

AHAM Association of Home Appliance Manufacturers
<http://www.aham.org>

AISC American Institute of Steel Construction
<http://www.aisc.org>

AISI American Iron and Steel Institute
<http://www.steel.org>

AITC American Institute of Timber Construction
<http://www.aitc-glulam.org>

AMCA Air Movement and Control Association, Inc.
<http://www.amca.org>

ANLA American Nursery & Landscape Association
<http://www.anla.org>

ANSI American National Standards Institute, Inc.
<http://www.ansi.org>

APA The Engineered Wood Association
<http://www.apawood.org>

ARI Air-Conditioning and Refrigeration Institute
<http://www.ari.org>

ASAE American Society of Agricultural Engineers
<http://www.asae.org>

ASCE American Society of Civil Engineers
<http://www.asce.org>

ASHRAE American Society of Heating, Refrigerating, and
Air-Conditioning Engineers
<http://www.ashrae.org>

ASME American Society of Mechanical Engineers
<http://www.asme.org>

ASSE American Society of Sanitary Engineering
<http://www.asse-plumbing.org>

ASTM American Society for Testing and Materials
<http://www.astm.org>

AWI Architectural Woodwork Institute
<http://www.awinet.org>

AWS American Welding Society
<http://www.aws.org>

AWWA American Water Works Association
<http://www.awwa.org>

BHMA Builders Hardware Manufacturers Association
<http://www.buildershardware.com>

BIA Brick Institute of America
<http://www.bia.org>

CAGI Compressed Air and Gas Institute
<http://www.cagi.org>

CGA Compressed Gas Association, Inc.
<http://www.cganet.com>

CI The Chlorine Institute, Inc.
<http://www.chlorineinstitute.org>

CISCA Ceilings and Interior Systems Construction Association
<http://www.cisca.org>

CISPI Cast Iron Soil Pipe Institute
<http://www.cispi.org>

CLFMI Chain Link Fence Manufacturers Institute
<http://www.chainlinkinfo.org>

CPMB Concrete Plant Manufacturers Bureau
<http://www.cpmb.org>

CRA California Redwood Association
<http://www.calredwood.org>

CRSI Concrete Reinforcing Steel Institute
<http://www.crsi.org>

CTI Cooling Technology Institute
<http://www.cti.org>

DHI Door and Hardware Institute
<http://www.dhi.org>

EGSA Electrical Generating Systems Association
<http://www.egsa.org>

EEI Edison Electric Institute
<http://www.eei.org>

EPA Environmental Protection Agency
<http://www.epa.gov>

ETL ETL Testing Laboratories, Inc.
<http://www.etl.com>

FAA Federal Aviation Administration
<http://www.faa.gov>

FCC Federal Communications Commission
<http://www.fcc.gov>

FPS The Forest Products Society
<http://www.forestprod.org>

GANA Glass Association of North America
<http://www.cssinfo.com/info/gana.html/>

FM Factory Mutual Insurance
<http://www.fmglobal.com>

GA Gypsum Association
<http://www.gypsum.org>

GSA General Services Administration
<http://www.gsa.gov>

HI Hydraulic Institute
<http://www.pumps.org>

HPVA Hardwood Plywood & Veneer Association
<http://www.hpva.org>

ICBO International Conference of Building Officials
<http://www.icbo.org>

ICEA Insulated Cable Engineers Association Inc.
<http://www.icea.net>

\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>

NWWDA Window and Door Manufacturers Association
<http://www.nwwda.org>

OSHA Occupational Safety and Health Administration
Department of Labor
<http://www.osha.gov>

PCA Portland Cement Association
<http://www.portcement.org>

PCI Precast Prestressed Concrete Institute
<http://www.pci.org>

PPI The Plastic Pipe Institute
<http://www.plasticpipe.org>

PEI Porcelain Enamel Institute, Inc.
<http://www.porcelainenamel.com>

PTI Post-Tensioning Institute
<http://www.post-tensioning.org>

RFCI The Resilient Floor Covering Institute
<http://www.rfci.com>

RIS Redwood Inspection Service
See - CRA

RMA Rubber Manufacturers Association, Inc.
<http://www.rma.org>

SCMA Southern Cypress Manufacturers Association
<http://www.cypressinfo.org>

SDI Steel Door Institute
<http://www.steeldoor.org>

IGMA Insulating Glass Manufacturers Alliance
<http://www.igmaonline.org>

SJI Steel Joist Institute
<http://www.steeljoist.org>

SMACNA Sheet Metal and Air-Conditioning Contractors
National Association, Inc.
<http://www.smacna.org>

SSPC The Society for Protective Coatings
<http://www.sspc.org>

STI Steel Tank Institute
<http://www.steeltank.com>

SWI Steel Window Institute
<http://www.steelwindows.com>

TCA Tile Council of America, Inc.
<http://www.tileusa.com>

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 45 29
TESTING LABORATORY SERVICES**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor.

1.2 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-06.....Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006).....Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-01 (R2004).....The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
 - T104-99 (R2003).....Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T180-01 (R2004).....Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
 - T191-02(R2006).....Density of Soil In-Place by the Sand-Cone Method

C. American Concrete Institute (ACI):

506.4R-94 (R2004).....Guide for the Evaluation of Shotcrete

D. ASTM International:

A325-06.....Structural Bolts, Steel, Heat Treated, 120/105
ksi Minimum Tensile Strength

A370-07.....Definitions for Mechanical Testing of Steel
Products

A416/A416M-06.....Steel Strand, Uncoated Seven-Wire for
Prestressed Concrete

A490-06.....Heat Treated Steel Structural Bolts, 150 ksi
Minimum Tensile Strength

C31/C31M-06.....Making and Curing Concrete Test Specimens in
the Field

C33-03.....Concrete Aggregates

C39/C39M-05.....Compressive Strength of Cylindrical Concrete
Specimens

C109/C109M-05.....Compressive Strength of Hydraulic Cement
Mortars

C138-07.....Unit Weight, Yield, and Air Content
(Gravimetric) of Concrete

C140-07.....Sampling and Testing Concrete Masonry Units and
Related Units

C143/C143M-05.....Slump of Hydraulic Cement Concrete

C172-07.....Sampling Freshly Mixed Concrete

C173-07.....Air Content of freshly Mixed Concrete by the
Volumetric Method

C330-05.....Lightweight Aggregates for Structural Concrete

C567-05.....Density Structural Lightweight Concrete

C780-07.....Pre-construction and Construction Evaluation of
Mortars for Plain and Reinforced Unit Masonry

C1019-08.....Sampling and Testing Grout

C1064/C1064M-05.....Freshly Mixed Portland Cement Concrete

C1077-06.....Laboratories Testing Concrete and Concrete
Aggregates for Use in Construction and Criteria
for Laboratory Evaluation

C1314-07.....Compressive Strength of Masonry Prisms

D698-07.....Laboratory Compaction Characteristics of Soil
Using Standard Effort

D1143-07.....Piles Under Static Axial Compressive Load

D1188-07.....Bulk Specific Gravity and Density of Compacted
Bituminous Mixtures Using Paraffin-Coated
Specimens

D1556-07.....Density and Unit Weight of Soil in Place by the
Sand-Cone Method

D1557-07.....Laboratory Compaction Characteristics of Soil
Using Modified Effort

D2166-06.....Unconfined Compressive Strength of Cohesive
Soil

D2167-94(R2001).....Density and Unit Weight of Soil in Place by the
Rubber Balloon Method

D2216-05.....Laboratory Determination of Water (Moisture)
Content of Soil and Rock by Mass

D2922-05.....Density of soil and Soil-Aggregate in Place by
Nuclear Methods (Shallow Depth)

D2974-07.....Moisture, Ash, and Organic Matter of Peat and
Other Organic Soils

D3666-(2002).....Minimum Requirements for Agencies Testing and
Inspection Bituminous Paving Materials

D3740-07.....Minimum Requirements for Agencies Engaged in
the Testing and Inspecting Road and Paving
Material

E94-04.....Radiographic Testing

E164-03.....Ultrasonic Contact Examination of Weldments

E329-07.....Agencies Engaged in Construction Inspection
and/or Testing

E543-06.....Agencies Performing Non-Destructive Testing

E605-93(R2006).....Thickness and Density of Sprayed Fire-Resistive
Material (SFRM) Applied to Structural Members

E709-(2001).....Guide for Magnetic Particle Examination

E1155-96(R2008).....Determining FF Floor Flatness and FL Floor
Levelness Numbers

E. American Welding Society (AWS):

D1.1-07.....Structural Welding Code-Steel

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E 329, C 1077, D 3666, D3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Resident Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Resident Engineer to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to Resident Engineer immediately of any irregularity.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION**3.1 EARTHWORK:**

A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Resident Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Resident Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
2. Provide part time observation of fill placement and compaction and field density testing in building areas and provide part time observation of fill placement and compaction and field density testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.
3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with // AASHTO // T99/T180 // Method A // // ASTM // D698 // D1557 // Method A // ASTM D698 and/or ASTM D1557.
2. Make field density tests in accordance with the primary testing method following ASTM D2922 // AASHTO T238 // wherever possible. Field density tests utilizing ASTM D1556 // AASHTO T191 //, or // ASTM D2167 // shall be utilized on a case by case basis only if there are problems with the validity of the results from the primary

method due to specific site field conditions. Should the testing laboratory propose these alternative methods, they should provide satisfactory explanation to the Resident Engineer before the tests are conducted.

- a. Building Slab Subgrade: At least one test of subgrade for every 185 m² (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m² (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
 - b. Foundation Wall Backfill: One test per 30 m (100 feet) of each layer of compacted fill but in no case fewer than two tests.
 - c. Pavement Subgrade: One test for each 335 m² (400 square yards), but in no case fewer than two tests.
 - d. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
 - e. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.
 - f. Footing Subgrade: At least one test for each layer of soil on which footings will be placed. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested subgrade when acceptable to Resident Engineer. In each compacted fill layer below wall footings, perform one field density test for every 30 m (100 feet) of wall. Verify subgrade is level, all loose or disturbed soils have been removed, and correlate actual soil conditions observed with those indicated by test borings.
- C. Testing for Footing Bearing Capacity: Evaluate if suitable bearing capacity material is encountered in footing subgrade.
- D. Testing Materials: Test suitability of on-site and off-site borrow as directed by Resident Engineer.

3.4 LANDSCAPING:

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.
 - 1. Test for organic material by using ASTM D2974.
 - 2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.
- B. Submit laboratory test report of topsoil to Resident Engineer.

3.5 ASPHALT CONCRETE PAVING:

- A. Aggregate Base Course:
 - 1. Determine maximum density and optimum moisture content for aggregate base material in accordance with ASTM D1557, Method D.
 - 2. Make a minimum of three field density tests on each day's final compaction on each aggregate course in accordance with ASTM D1556.
 - 3. Sample and test aggregate as necessary to insure compliance with specification requirements for gradation, wear, and soundness as specified in the applicable state highway standards and specifications.
- B. Asphalt Concrete:
 - 1. Aggregate: Sample and test aggregates in stock pile and hot-bins as necessary to insure compliance with specification requirements for gradation (AASHTO T27), wear (AASHTO T96), and soundness (AASHTO T104).
 - 2. Temperature: Check temperature of each load of asphalt concrete at mixing plant and at site of paving operation.
 - 3. Density: Make a minimum of two field density tests in accordance with ASTM D1188 of asphalt base and surface course for each day's paving operation.

3.6 SITE WORK CONCRETE:

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.8 CONCRETE:**A. Batch Plant Inspection and Materials Testing:**

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of Resident Engineer with concurrence of Contracting Officer and perform periodic inspections thereafter as determined by Resident Engineer.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to Resident Engineer.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.

3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m³ (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. // After good concrete quality control has been established and maintained as determined by Resident Engineer make three cylinders for each 80 m³ (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. // Label each cylinder with an identification number. Resident Engineer may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m³ (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m³ (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
9. Verify that specified mixing has been accomplished.
10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:

- a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.
12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
15. Observe preparations for placement of concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
17. Observe concrete mixing:
 - a. Monitor and record amount of water added at project site.
 - b. Observe minimum and maximum mixing times.
18. Measure concrete flatwork for levelness and flatness as follows:

- a. Perform Floor Tolerance Measurements F_F and F_L in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
 - b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
 - c. Provide the Contractor and the Resident Engineer with the results of all profile tests, including a running tabulation of the overall F_F and F_L values for all slabs installed to date, within 72 hours after each slab installation.
19. Other inspections:
- a. Grouting under base plates.
 - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
- C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by Resident Engineer. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
 3. Furnish certified compression test reports (duplicate) to Resident Engineer. In test report, indicate the following information:
 - a. Cylinder identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Type of concrete, slump, and percent air.
 - d. Compressive strength of concrete in MPa (psi).
 - e. Weight of lightweight structural concrete in kg/m^3 (pounds per cubic feet).
 - f. Weather conditions during placing.

- g. Temperature of concrete in each test cylinder when test cylinder was molded.
- h. Maximum and minimum ambient temperature during placing.
- i. Ambient temperature when concrete sample in test cylinder was taken.
- j. Date delivered to laboratory and date tested.

3.9 REINFORCEMENT:

- A. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- B. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- C. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.14 STRUCTURAL STEEL:

- A. General: Provide shop and field inspection and testing services to certify structural steel work is done in accordance with contract documents. Welding shall conform to AWS D1.1 Structural Welding Code.
- B. Prefabrication Inspection:
 - 1. Review design and shop detail drawings for size, length, type and location of all welds to be made.
 - 2. Approve welding procedure qualifications either by pre-qualification or by witnessing qualifications tests.
 - 3. Approve welder qualifications by certification or retesting.
 - 4. Approve procedure for control of distortion and shrinkage stresses.
 - 5. Approve procedures for welding in accordance with applicable sections of AWS D1.1.
- C. Fabrication and Erection:
 - 1. Weld Inspection:

- a. Inspect welding equipment for capacity, maintenance and working condition.
 - b. Verify specified electrodes and handling and storage of electrodes in accordance with AWS D1.1.
 - c. Inspect preparation and assembly of materials to be welded for conformance with AWS D1.1.
 - d. Inspect preheating and interpass temperatures for conformance with AWS D1.1.
 - e. Measure 25 percent of fillet welds.
 - f. Welding Magnetic Particle Testing: Test in accordance with ASTM E709 for a minimum of:
 - 1) 20 percent of all shear plate fillet welds at random, final pass only.
 - 2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
 - 3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
 - 4) 20 percent of length of built-up column member partial penetration and fillet welds at random for root and final passes.
 - 5) 100 percent of length of built-up girder member partial penetration and fillet welds for root and final passes.
 - g. Welding Ultrasonic Testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds, braced and moment frame column splices, and a minimum of 20 percent of all other partial penetration column splices, at random.
 - i. Verify that correction of rejected welds are made in accordance with AWS D1.1.
 - j. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.
2. Bolt Inspection:

- a. Inspect high-strength bolted connections in accordance AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
 - b. Slip-Critical Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in each connection in accordance with AISC Specifications for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
 - c. Fully Pre-tensioned Connections: Inspect 10 percent of bolts, but not less than 2 bolts, selected at random in 25 percent of connections in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts. Inspect all bolts in connection when one or more are rejected.
 - d. Bolts installed by turn-of-nut tightening may be inspected with calibrated wrench when visual inspection was not performed during tightening.
 - e. Snug Tight Connections: Inspect 10 percent of connections verifying that plies of connected elements have been brought into snug contact.
 - f. Inspect field erected assemblies; verify locations of structural steel for plumbness, level, and alignment.
- D. Submit inspection reports, record of welders and their certification, and identification, and instances of noncompliance to Resident Engineer.

3.18 TYPE OF TEST:

A. Earthwork:

Laboratory Compaction Test, Soils:

(ASTM D1557)(ASTM D698) _____

Field Density, Soils (AASHTO T191, T205, or T238) _____

Penetration Test, Soils _____

B. Landscaping:

Topsoil Test _____

C. Aggregate Base:

Laboratory Compaction, // (AASHTO T180)// //(ASTM D1557)// _____

Field Density, //(AASHTO T191)// //(ASTM D1556)// _____

Aggregate, Base Course Gradation (AASHTO T27) _____

Wear (AASHTO T96) _____

Soundness (AASHTO T104) _____

D. Concrete:

Making and Curing Concrete Test Cylinders (ASTM C31) _____

Compressive Strength, Test Cylinders (ASTM C39) _____

Concrete Slump Test (ASTM C143) _____

Concrete Air Content Test (ASTM C173) _____

Unit Weight, Lightweight Concrete (ASTM C567) _____

Aggregate, Normal Weight:

Gradation (ASTM C33) _____

Deleterious Substances (ASTM C33) _____

Soundness (ASTM C33) _____

Abrasion (ASTM C33) _____

Aggregate, Lightweight

Gradation (ASTM C330) _____

Deleterious Substances (ASTM C330) _____

Unit Weight (ASTM C330) _____

Flatness and Levelness Readings (ASTM E1155) (number of days) _____

F. Reinforcing Steel:

Tensile Test (ASTM A370) _____

Bend Test (ASTM A370) _____

Mechanical Splice (ASTM A370) _____

Welded Splice Test (ASTM A370) _____

L. Inspection:

Technical Personnel (Man-days) _____

- - - E N D - - -

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL**1.1 DESCRIPTION**

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
1. Adversely effect human health or welfare,
 2. Unfavorably alter ecological balances of importance to human life,
 3. Effect other species of importance to humankind, or;
 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
 6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 7. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage and human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):
33 CFR 328.....Definitions

1.4 SUBMITTALS

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 - 1. Environmental Protection Plan: After the contract is awarded and prior to the NTP, the Contractor shall meet with the Contracting Officer's Technical Representative to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, but before the NTP is issued, the Contractor shall prepare and submit to the Construction Project Manager/COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.
 - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.

- k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including top soil, and land forms without permission from the Construction Project Manager/COR.
1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 2. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 3. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
 - a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 10 (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
 - b. Reuse or conserve the collected topsoil sediment as directed by the Contracting Officer's Technical Representative. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING AND SOIL PREPARATION.
 - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
 4. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.

5. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 6. Manage and control spoil areas on Government property to limit spoil to areas and prevent erosion of soil or sediment from entering nearby water courses or lakes.
 7. Protect adjacent areas from despoilment by temporary excavations and embankments.
 8. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 9. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 10. Handle discarded materials other than those included in the solid waste category as directed by the Contracting Officer's Technical Representative.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
 3. Monitor water areas affected by construction.
- D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of California, California Air Pollution Statute, Rule, Regulation and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.

3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Construction Project Manager/COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise as per Section 010000 General Requirements, 1.12 Work Hours unless otherwise instructed by the Construction Project Manager/COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

1. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS,	80	PNEUMATIC TOOLS	80
STATIONARY			
PUMPS	75		
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75
 - b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

2. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Contracting Officer's Technical Representative noting any problems and the alternatives for mitigating actions.
- F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Construction Project Manager/COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The contractor shall submit a Construction Waste Management Plan within 10 days of receiving the NTP for approval showing how the contractor will meet the requirements of this section. The NTP will not be issued until there is an Approved Construction Waste Management Plan.
- B. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- C. 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.
- D. 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.
- E. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, 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 (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or 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 50 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, i.e. 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 Construction Project Manager/COR a written Construction Waste Management Plan. The plan shall include, but not be limited to, the following information:

1. Procedures to be used for 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/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 and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 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

1.7 RECORDS

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 respective 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.
- D. **The monthly application for progress payment will not be processed without a monthly summary of construction and demolition debris diversion and disposal.**

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SECTION 02 41 00**DEMOLITION****PART 1 - GENERAL****1.1 DESCRIPTION:**

This section specifies demolition and removal electrical equipment as described in the Statement Of Work..

1.2 RELATED WORK:

NOT USED.

1.3 PROTECTION:

- A. 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, and ACCIDENT PREVENTION.
- B. 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 1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
- E. 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.

- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
1. No wall or part of wall shall be permitted to fall outwardly from structures.
 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.
- G. 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.
- H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

1.4 UTILITY SERVICES:

- A. Demolish and remove outside utility service lines shown to be removed.
- B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 DEMOLITION:**

- A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
 - 1. As required for installation of new utility service lines.
 - 2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.
- 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 to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- C. In removing buildings and structures of more than two stories, demolish work story by story starting at highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.
- D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. 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. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- 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 ABANDONMENT OF UTILITIES:

- A. Fill pipes and utility structures to be abandoned with lean concrete.
- B. Cap and plug pipe and other conduits abandoned, with tight fitting plug or wall of concrete, minimum 6-inches thick.

3.3 CLEAN-UP:

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 off the Medical Center disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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SECTION 26 05 11**REQUIREMENTS FOR ELECTRICAL INSTALLATIONS****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This Section 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, applies to all sections of Division 26.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the design specifications and drawings.
- C. Wiring ampacities specified or shown on the design drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.
- D. Refer to Division 1 for general requirements.
- E. Design Engineers
 - 1. Provide a Design Engineer who shall prepare Drawings and Specifications for the electrical systems. Design Engineer shall be a Professional Electrical Engineer registered in the State of California.
 - 2. The Design Engineer shall prepare load calculations based on the Design Criteria contained in the scope of work and provide a letter indicating their concurrence with the system requirements or indicating specific differences to be resolved. The Design Engineer's approval of these calculations shall be submitted to the resident engineer for approval before proceeding with preparation of working drawings.
 - 3. Engineer-of-Record: The Design Engineer shall be the Engineer-of-Record. Engineer-of-Record shall provide required statements and certifications.

1.2 MINIMUM REQUIREMENTS

- A. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.3 TEST STANDARDS

- A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:
 - 1. Listed; equipment or device of a kind mentioned which:
 - a. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
 - b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
 - 2. Labeled; equipment or device is when:
 - a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.

- b. The laboratory makes periodic inspections of the production of such equipment.
 - c. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
3. Certified; equipment or product is which:
- a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
 - c. Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
- 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 - 2. The Government reserves the right to require the Contractor to submit a list of installations where the products 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 eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class of 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 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 VA through the Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.6 EQUIPMENT REQUIREMENTS

- A. Where variations from the contract requirements are requested in accordance with Section 00 72 00, GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, 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.

1.7 EQUIPMENT PROTECTION

- A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:
1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
 2. Damaged equipment shall be, as determined by the Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
 3. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
 4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.8 WORK PERFORMANCE

- A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K 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. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
 3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented by the Resident Engineer and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.
 4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Director of the Medical Center.
- D. For work on existing stations, arrange, phase and perform work to assure electrical service for other buildings at all times. 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 and carefully. 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 interferences. See Section 00 72 00, GENERAL CONDITIONS.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the NEC for all voltages specified.
- C. Inaccessible Equipment:
 - 1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
 - 2. "Conveniently accessible" is defined as being capable of being reached 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.

1.10 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 panel boards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Nameplates shall be laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.11 SUBMITTALS

- A. Submit in accordance with Section 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify 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 01 33 23".
 - 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, 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,) associated with equipment or piping so that the proposed installation can be properly reviewed.

3. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 4. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
- F. Manuals: Submit in accordance with SECTION 01 00 00 - GENERAL REQUIREMENTS.
1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract 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 system 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 and maintenance instructions.
 - e. Safety precautions.
 - f. Diagrams and illustrations.
 - g. Testing methods.
 - h. Performance data.
 - i. Lubrication schedule including type, grade, temperature range, and frequency.
 - j. 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 parts, and name of servicing organization.
 - k. Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.
- G. Approvals will be based on complete submission of manuals together with shop drawings.
- H. After approval and prior to installation, furnish the Resident Engineer with one sample of each of the following:
1. A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
 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, outlet box, manual motor starter, device plate, engraved nameplate, wire and cable splicing and terminating material and single pole molded case circuit breaker.
 6. Each type of light fixture specified in Section 26 51 00, INTERIOR LIGHTING or shown on the drawings.

1.12 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.

1.13 TRAINING

- A. Training shall be provided in accordance with Article, INSTRUCTIONS, of SECTION 01 00 00 - GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Resident Engineer at least 30 days prior to the planned training.

----- E N D -----

SECTION 26 05 21**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW)****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This SECTION specifies the furnishing, installation, and connection of the low voltage power and lighting wiring.

1.2 RELATED WORK

- A. Excavation and backfill for cables that are installed in conduit:
SECTION 31 20 11.
- B. General electrical requirements that are common to more than one SECTION in DIVISION 26: SECTION 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- C. Conduits for cables and wiring: SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
- D. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

- A. In accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 - 1. Manufacturer's Literature and Data: Showing each cable type and rating.
 - 2. Certificates: Two weeks prior to final inspection, deliver to the Resident Engineer four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

1.4 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 the basic designation only.
- B. American Society of Testing Material (ASTM):
D2301-04 Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape
- C. Federal Specifications (Fed. Spec.):
A-A-59544-00 Cable and Wire, Electrical (Power, Fixed Installation)
- D. National Fire Protection Association (NFPA):
70-05 National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
44-02 Thermoset-Insulated Wires and Cables
83-03 Thermoplastic-Insulated Wires and Cables
467-01 Electrical Grounding and Bonding Equipment
486A-01 Wire Connectors and Soldering Lugs for Use with Copper Conductors
486C-02 Splicing Wire Connectors
486D-02 Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations
486E-00 Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-01 Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable
514B-02 Fittings for Cable and Conduit
1479-03 Fire Tests of Through-Penetration Fire Stops

PART 2 - PRODUCTS**2.1 CABLE AND WIRE (POWER AND LIGHTING)**

- A. Cable and Wire shall be in accordance with Fed. Spec. A-A-59544, except as hereinafter specified.
- B. Single Conductor:
1. Shall be annealed copper.
 2. Shall be stranded for sizes No. 8 AWG and larger, solid for sizes No. 10 AWG and smaller.
 3. Shall be minimum size No. 12 AWG, except where smaller sizes are allowed herein.
- C. Insulation:
1. THW, XHHW, or dual rated THHN-THWN shall be in accordance with UL 44, and 83.
 2. Direct burial: UF or USE shall be in accordance with UL 493.
 3. Isolated power system wiring: Type XHHW with a dielectric constant of 3.5 or less.
- D. Color Code:
1. Secondary service, feeder and branch circuit conductors shall be color coded as follows:

208/120 volt	Phase	480/277 volt
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

- a. The lighting circuit "switch legs" and 3-way switch "traveling wires" shall have color coding unique and distinct (i.e. pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Field coordinate for a final color coding with the Resident Engineer.
2. Use solid color compound or solid color coating for No. 12 AWG and No. 10 AWG branch circuit conductors and neutral sizes.
3. Phase conductors No. 8 AWG and larger shall be color-coded using one of the following methods:
 - a. Solid color compound or solid color coating.
 - b. Stripes, bands, or hash marks of color specified above.
 - c. Color as specified using 19 mm (3/4 inch) wide tape. Apply tape in half overlapping turns for a minimum of 75 mm (three inches) for terminal points, and in junction boxes, pull boxes, troughs, manholes, and handholes. 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.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
5. Color code for isolated power system wiring shall be in accordance with the NEC.

2.2 SPLICES AND JOINTS

- A. In accordance with UL 486A, C, D, E and NEC.
- B. Branch circuits (No. 10 AWG and smaller):
 1. Connectors: Solderless, screw-on, reusable pressure cable type, 600 volt, 105 degree C with integral insulation, approved for copper and aluminum conductors.
 2. The integral insulator shall have a skirt to completely cover the stripped wires.

3. The number, size, and combination of conductors, as listed on the manufacturers packaging shall be strictly complied with.

C. Feeder Circuits:

1. Connectors shall be indent, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material.
2. Field installed compression connectors for cable sizes 250 kcmil and larger shall have not less than two clamping elements or compression indents per wire.
3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Insulate with not less than that of the conductor level that is being joined.
4. Plastic electrical insulating tape: ASTM D2304 shall apply, flame retardant, cold and weather resistant.

2.3 CONTROL WIRING

- A. Unless otherwise specified in other SECTIONS of these specifications, control wiring shall be as specified for power and lighting wiring, except the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

2.4 WIRE LUBRICATING COMPOUND

- A. Suitable for the wire insulation and conduit it is used with, and shall not harden or become adhesive.
- B. Shall not be used on wire for isolated type electrical power systems.

2.5 FIREPROOFING TAPE

- A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.

- B. The tape shall be self-extinguishing and shall not support combustion. It shall be arc-proof and fireproof.
- C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.
- D. The finished application shall withstand a 200-ampere arc for not less than 30 seconds.
- E. Securing tape: Glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (3/4 inch) wide.

2.6 WARNING TAPE

- A. The tape shall be standard, 76 mm (3 inch) wide, 4-Mil polyethylene detectable type.
- B. The tape shall be red with black letters indicating "CAUTION BURIED ELECTRIC LINE BELOW".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install in accordance with the NEC, and as specified.
- B. Install all wiring in raceway systems.
- C. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.
- D. Wires of different systems (i.e. 120V, 277V) shall not be installed in the same conduit or junction box system.
- 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. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.
- G. Seal cable and wire entering a building from underground, between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.
- H. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 - 2. Use ropes made of nonmetallic material for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Resident Engineer.
 - 4. Pull in multiple cables together in a single conduit.
- I. No more than (3) single-phase branch circuits shall be installed in any one conduit.
- J. The wires shall be derated in accordance with NEC Article 310. Neutral wires, under conditions defined by the NEC, shall be considered current-carrying conductors.

3.2 INSTALLATION IN MANHOLES

- A. Install and support cables in manholes on the steel racks with porcelain or equal insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.
- B. Fireproofing:
 - 1. Install fireproofing where low voltage cables are installed in the same manholes with high voltage cables; also cover the low voltage cables with arc proof and fireproof tape.
 - 2. Use tape of the same type as used for the high voltage cables, and apply the tape in a single layer, one-half lapped or as

recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (one inch) into each duct.

3. Secure the tape in place by a random wrap of glass cloth tape.

3.3 SPLICE INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the Government.

3.4 CONTROL AND SIGNAL WIRING INSTALLATION

- A. Unless otherwise specified in other SECTIONS install wiring and connect to equipment/devices to perform the required functions as shown and specified.
- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where separate power supply circuits are not shown, connect the systems to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.
- D. Install a red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.
- E. System voltages shall be 120 volts or lower where shown on the drawings or as required by the NEC.

3.5 CONTROL AND SIGNAL SYSTEM IDENTIFICATION

- A. Install a permanent wire marker on each wire at each termination.

- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.6 FEEDER IDENTIFICATION

- A. In each interior pulbox and junction box, install metal tags on each circuit cables and wires to clearly designate their circuit identification and voltage.
- B. In each manhole and handhole, provide tags of the embossed brass type, showing the cable type and voltage rating. Attach the tags to the cables with slip-free plastic cable lacing units.

3.7 EXISTING WIRING

- A. Unless specifically indicated on the plans, existing wiring shall not be reused for the new installation. Only wiring that conforms to the specifications and applicable codes may be reused. If existing wiring does not meet these requirements, existing wiring may not be reused and new wires shall be installed.

3.8 FIELD TESTING

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices such as fixtures, motors, or appliances.
- B. Tests shall be performed by megger and conductors shall test free from short-circuits and grounds.
- C. Test conductor phase-to-phase and phase-to-ground.
- D. The Contractor shall furnish the instruments, materials, and labor for these tests.

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----- E N D -----

SECTION 26 05 26**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****3.1 DESCRIPTION**

- A. This section specifies general grounding and bonding requirements of electrical equipment operations and to provide a low impedance path for possible ground fault currents.
- B. "Grounding electrode system" refers to all electrodes required by NEC, as well as including made, supplementary, lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

3.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items which are common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.

3.3 SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.
- C. Test Reports: Provide certified test reports of ground resistance.
- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Resident Engineer:
1. Certification that the materials and installation is in accordance with the drawings and specifications.
 2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

3.4 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 the basic designation only.
- B. American Society for Testing and Materials (ASTM):
1. B1-2001 Standard Specification for Hard-Drawn Copper Wire
 2. B8-2004 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
1. 81-1983 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- D. National Fire Protection Association (NFPA):
1. 70-2005 National Electrical Code (NEC)
 2. 99-2005 Health Care Facilities
- E. Underwriters Laboratories, Inc. (UL):
1. 44-2005 Thermoset-Insulated Wires and Cables

2. 83-2003 Thermoplastic-Insulated Wires and Cables
3. 467-2004 Grounding and Bonding Equipment
4. 486A-486B-2003 Wire Connectors

PART 4 - PRODUCTS

4.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes 25 mm² (4 AWG) and larger shall be permitted to be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be ASTM B1 solid bare copper wire.
- C. Isolated Power System: Type XHHW-2 insulation with a dielectric constant of 3.5 or less.
- D. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

4.2 GROUND RODS

- A. Copper clad steel, 19 mm (3/4-inch) diameter by 3000 mm (10 feet) long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance.

4.3 SPLICES AND TERMINATION COMPONENTS

- A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

4.4 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:
 - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lockwashers.
 - 2. Ground Busbars: Two-hole compression type lugs using tin-plated copper or copper alloy bolts and nuts.
 - 3. Rack and Cabinet Ground Bars: one-hole compression-type lugs using zinc-plated or copper alloy fasteners.

4.5 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 with minimum dimensions of 4 mm thick by 19 mm wide (3/8 inch x 3/4 inch).

4.6 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 screw lug-type terminal blocks.

4.7 SPLICE CASE GROUND ACCESSORIES

- A. Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use 16 mm² (6 AWG) insulated ground wire with shield bonding connectors.

PART 5 - EXECUTION**5.1 GENERAL**

- A. Ground in accordance with the NEC, as shown on drawings, and as hereinafter specified.

- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.
- D. Special Grounding: For patient care area electrical power system grounding, conform to NFPA 99, and NEC.

5.2 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections, which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

5.3 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.
- C. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.

D. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
3. Conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.

E. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits.

F. 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.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

G. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.

H. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.

I. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the

fixtures through the conduit systems. 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.

- J. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- K. Panelboard Bonding: The equipment grounding terminal buses of the normal and essential branch circuit panelboards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than 16 mm² (10 AWG). These conductors shall be installed in rigid metal conduit.

5.4 CORROSION INHIBITORS

- A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

5.5 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the gases and suction piping, at the outlets, directly to the room or patient ground bus.

5.6 ELECTRICAL ROOM GROUNDING

- A. Building Earth Ground Busbars: Provide ground busbar hardware at each electrical room and connect to pigtail extensions of the building grounding ring.

5.7 WIREWAY GROUNDING

- A. Ground and Bond Metallic Wireway Systems as follows:

- B. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 16 mm² (6 AWG) bonding jumper at all intermediate metallic enclosures and across all section junctions.
- C. Install insulated 16 mm² (6 AWG) bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 16 meters (50 feet).
- D. Use insulated 16 mm² (6 AWG) bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.
- E. Use insulated 16 mm² (6 AWG) bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 meters.

5.8 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 5 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Government. Final tests shall assure that this requirement is met.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Below-grade connections shall be visually inspected by the Resident Engineer prior to backfilling. The Contractor shall notify the

Resident Engineer 24 hours before the connections are ready for inspection.

5.9 GROUND ROD INSTALLATION

- A. Drive each rod vertically in the earth, not less than 3000 mm (10 feet) in depth.
- B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

----- E N D -----

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. General electrical requirements and items that is common to more than one SECTION of Division 26: SECTION 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

- A. In accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. 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.

4. The specific item proposed and its area of application shall be identified on the catalog cuts.

C. Certification: Prior to final inspection, deliver to the Resident Engineer four copies of the certification that the material is in accordance with the drawings and specifications and has been properly installed.

1.4 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 the basic designation only.

B. National Fire Protection Association (NFPA):

1. 70-05 National Electrical Code (NEC)

C. Underwriters Laboratories, Inc. (UL):

1. 1-03 Flexible Metal Conduit

2. 5-01 Surface Metal Raceway and Fittings

3. 6-03 Rigid Metal Conduit

4. 50-03 Enclosures for Electrical Equipment

5. 360-03 Liquid-Tight Flexible Steel Conduit

6. 467-01 Grounding and Bonding Equipment

7. 514A-01 Metallic Outlet Boxes

8. 514B-02 Fittings for Cable and Conduit

9. 514C-05 Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers

10. 651-02 Schedule 40 and 80 Rigid PVC Conduit

11. 651A-03 Type EB and A Rigid PVC Conduit and HDPE Conduit

12. 797-03 Electrical Metallic Tubing

13. 1242-00 Intermediate Metal Conduit

D. National Electrical Manufacturers Association (NEMA):

1. TC-3-04 PVC Fittings for Use with Rigid PVC Conduit and Tubing
2. FB1-03 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 1 inch unless otherwise shown. Where permitted by the NEC, 1 inch flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
 1. Rigid galvanized steel: Shall Conform to UL 6, ANSI C80.1.
 2. Rigid aluminum: Shall Conform to UL 6A, ANSI C80.5.
 3. Rigid intermediate steel conduit (IMC): Shall Conform to UL 1242, ANSI C80.6.
 4. Electrical metallic tubing (EMT): Shall Conform to UL 797, ANSI C80.3. Maximum size not to exceed 105 mm (4 inch) and shall be permitted only with cable rated 600 volts or less.
 5. Flexible galvanized steel conduit: Shall Conform to UL 1.
 6. Liquid-tight flexible metal conduit: Shall Conform to UL 360.
 7. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
 8. 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 ANSI/NEMA FB1.

- b. Standard threaded couplings, locknuts, bushings, 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. Rigid aluminum conduit fittings:
- a. Standard threaded couplings, locknuts, bushings, and elbows: Malleable iron, steel or aluminum alloy materials; Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4 percent copper are prohibited.
 - b. Locknuts and bushings: As specified for rigid steel and IMC conduit.
 - c. Set screw fittings: Not permitted for use with aluminum conduit.
3. Electrical metallic tubing fittings:
- a. Fittings shall meet the requirements of UL 514B and ANSI/NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.

- c. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 50 mm (2 inches) and smaller. Use set screw type couplings with four set screws each for conduit sizes over 50 mm (2 inches). Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
 - 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.
4. Flexible steel conduit fittings:
- a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
 - b. Clamp type, with insulated throat.
5. Liquid-tight flexible metal conduit fittings:
- a. Fittings shall meet the requirements of UL 514B and ANSI/NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
6. Direct burial plastic conduit fittings:
- a. Fittings shall meet the requirements of UL 514C and NEMA TC3.
 - b. As recommended by the conduit manufacturer.
7. Surface metal raceway fittings: As recommended by the raceway manufacturer.
8. Expansion and deflection couplings:
- a. Conform to UL 467 and UL 514B.
 - b. Accommodate, 19 mm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.

- c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
- d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

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.
- 3. Multiple conduit (trapeze) hangers: Not less than 38 mm by 38 mm (1-1/2 by 1-1/2 inch), 12 gage steel, cold formed, lipped channels; with not less than 9 mm (3/8 inch) 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 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.

- G. Warning Tape: Standard, 4-Mil polyethylene 76 mm (3 inch) wide tape detectable type, red with black letters, and imprinted with "CAUTION BURIED ELECTRIC LINE BELOW".

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Locate holes in advance where they are proposed in the structural SECTIONS such as ribs or beams. Obtain the approval of the Resident Engineer prior to drilling through structural SECTIONS.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Resident Engineer as required by limited working space.

- ##### B. Fire Stop: 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, with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between raceways and openings with the fire stop material.

- ##### C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in SECTION 07 92 00, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

- ##### A. In accordance with UL, NEC, as shown, and as hereinafter specified.

B. Install conduit as follows:

1. In complete runs before pulling in cables or wires.

2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
3. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
5. Mechanically and electrically continuous.
6. Independently support conduit at 8'0" on center. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts).
7. Support within 300 mm (1 foot) of changes of direction, and within 300 mm (1 foot) of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
9. Conduit installations under fume and vent hoods are prohibited.
10. 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.
11. Flashing of penetrations of the roof membrane is specified in SECTION 07 60 00, FLASHING AND SHEET METAL.
12. Do not use aluminum conduits in wet locations.
13. Unless otherwise indicated on the drawings or specified herein, all conduits shall be installed concealed within finished walls, floors and ceilings.

C. 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.

D. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the COR.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only when the following occurs:
 - a. Where shown on the structural drawings.
 - b. As approved by the Resident Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
 - a. Conduit outside diameter larger than 1/3 of the slab thickness is prohibited.
 - b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
 - c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (3/4 inch) of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the conduits. Tightening set screws with pliers is prohibited.

B. Furred or Suspended Ceilings and in Walls:

1. Conduit for conductors above 600 volts:

- a. Rigid steel or rigid aluminum.
 - b. Aluminum conduit mixed indiscriminately with other types in the same system is prohibited.
2. Conduit for conductors 600 volts and below:
 - a. Rigid steel, IMC, rigid aluminum, or EMT. Different type conduits mixed 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 1800 mm (six feet) of flexible metal conduit extending from a junction box to the fixture.
 5. Tightening set screws 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 volts:
 1. Rigid steel or rigid aluminum.
 2. Aluminum conduit mixed indiscriminately with other types in the same system is prohibited.
- C. Conduit for Conductors 600 volts and below:
 1. Rigid steel, IMC, rigid aluminum, or EMT. Different type of conduits mixed 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 2400 mm (eight foot) intervals.

- G. Surface metal raceways: Use only where shown.

3.5 DIRECT BURIAL INSTALLATION

- A. Exterior routing of Lighting Systems and Other Branch circuits (600 Volt and Less, and 1500 mm (5 feet) from the buildings):

1. Conduit: Thick wall PVC or high density PE, unless otherwise shown.
2. Mark conduit at uniform intervals to show the kind of material, direct burial type, and the UL approval label.
3. Install conduit fittings and terminations as recommended by the conduit manufacturer.
4. Tops of conduits shall be as follows unless otherwise shown:
 - a. Not less than 600 mm (24 inches) below finished grade.
 - b. Not less than 750 mm (30 inches) below road and other paved surfaces.
5. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.
6. Excavation for conduit bedding and back-filling of trenches is specified in SECTION 31 20 00, EARTH MOVING.
 - a. Cut the trenches neatly and uniformly.
 - b. Do not kink the conduits.
7. Seal conduits, including spare conduits, at building entrances and at outdoor terminations for equipment with a suitable compound that prevents the entrance of moisture and gases.
8. Where metal conduit is shown, install threaded heavy wall rigid steel galvanized conduit or type A20 rigid steel galvanized conduit coated with .5 mm (20 mil) bonded PVC, or rigid steel or IMC, PVC coated or standard coated with bituminous asphaltic compound.
9. Warning tape shall be continuously placed 300 mm (12 inches) above conduits or electric lines.

- B. Exterior routing of lighting systems and other branch circuits (600 volts and less-under buildings slab on grade to 1500 mm (5 feet) from the building):
 - 1. Pre-coated rigid galvanized steel conduit in accordance with the requirements of SECTION 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

3.6 WET OR DAMP LOCATIONS

- A. Unless otherwise shown, use conduits of rigid steel or IMC.
- B. Provide sealing fittings, to prevent passage of water vapor, where conduits pass from warm to cold locations, i.e., (refrigerated spaces, constant temperature rooms, air conditioned spaces building exterior walls, roofs) or similar spaces.
- C. Unless otherwise shown, use rigid steel or IMC conduit within 1500 mm (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall include an outer factory coating of .5 mm (20 mil) bonded PVC or field coat with asphaltum before installation. After installation, completely coat damaged areas of coating.

3.7 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. Provide liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside (air stream) of HVAC units, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with flexible metal conduit.

3.8 EXPANSION JOINTS

- A. Conduits 75 mm (3 inches) 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 75 mm (3 inches) with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 125 mm (5 inch) vertical drop midway between the ends. Flexible conduit shall have a copper green ground bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for 375 mm (15 inches) and larger conduits 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 375 mm (15 inches) of slack flexible conduit. Flexible conduit shall have a copper green ground bonding jumper installed.

3.9 CONDUIT SUPPORTS, INSTALLATION

- A. Safe working load shall not exceed 1/4 of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 2.5 m (8 foot) on center.
- 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 90 kg (200 pounds). 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 6 mm (1/4 inch) bolt size and not less than 28 mm (1-1/8 inch) embedment.
 - b. Power set fasteners not less than 6 mm (1/4 inch) diameter with depth of penetration not less than 75 mm (3 inches).
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts are permitted.
- 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. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except: Horizontal and vertical supports/fasteners within walls.
- L. 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.

3.10 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. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 600 mm (24 inch), center-to-center lateral spacing shall be maintained between boxes.)
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 100 mm (4 inches) square by 55 mm (2-1/8 inches) deep, with device covers for the wall material and thickness involved.
- F. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1".
- G. On all Branch Circuit junction box covers, identify the circuits with black marker.

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