TECHNICAL SPECIFICATIONS

Jonathan M. Wainwright Memorial VAMC

PROJECT 08-115: "Enhance Outpatient Security"
(Building #74)

Jonathan M. Wainwright Memorial VAMC
Walla Walla, Washington

8/15/08

James Hoar, Architect
614 Sixth Avenue
Lewiston, ID 83501

208-746-7197

Technical Specifications

For the Construction of –

Jonathan M. Wainwright Memorial VAMC:
PROJECT 08-115: "Enhance Outpatient Security" (Bldg. #74)

77 Wainwright Drive
Walla Walla, Washington

"OWNER": Dept. of Veterans Affairs Medical Center
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Walla Walla, WA 99362

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Project
Manual
Copy # _____

August 15, 2008

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GENERAL REQUIREMENTS

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PLEASE NOTE:

A. The original VA numbering system (paragraph designations and so forth) has been left intact in Specification Section 01 00 00 so that reference can be made to provisions that have been omitted (omitted because such provisions are not relevant to this Project...document was not "renumbered" subsequent to such omissions). Therefore, in many cases the paragraphs will "skip" (example: 1.1 General Intention subparagraph C., immediately below, "skips" to subparagraph E., because subparagraph D. was not relevant to this Project...however, the document was not "renumbered" after deleting D.).

B. **IMPORTANT**: Throughout this Section 01 00 00 and the entire Technical Specifications, as well as within other Contractual Documents regarding this Project, the terms "Project Engineer", "Resident Engineer", "Project Manager", "Contracting Officer", "Facility Safety Manager", "Facility Infection-Control Team" or "ICRA Team, "authorized

representative", and other similar terms are used widely to distinguish between various responsibilities and protocol. In various places such terms seemingly are used interchangeably. Regardless, the Contractor shall direct all inquiries and other administrative action and communications through the **VAMC's Project Manager**, who shall be identified at the Preconstruction Conference to be held between the Contractor and the VAMC Engineering Department. The VAMC's Project Manager may redirect such inquiries, action, and communications as the matters occur, or he may directly address the matter at hand, as determined solely by the VAMC's Project Manager.

IMPORTANT CONTRACT NOTE: Prior to entering into Contract for the construction of this Project, the Contractor shall verify, with the VAMC's Project Manager, whether or not the Project will be constructed under an 8a contract. If so, then the following **NOTICE** applies:

NOTICE: The provisions of this Section 01 00 00, GENERAL REQUIREMENTS, pertain only to the contract between the Small Business Administration and its selected subcontractor(s).

1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structure, and furnish labor and materials and perform work for the following Project: "Enhance Outpatient Security", A Remodel for: Jonathan M. Wainwright VAMC, Walla Walla WA, as required by drawings and specifications.

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

C. Offices of James Hoar, Architect, L&S Engineering, and Electrical Consultants, as Project Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

E. All employees of general contractor and subcontractors shall comply with the Walla-Walla-VAMC security management program and shall have formal authorization to work on this Project, shall be identified by project and employer, and shall be restricted from unauthorized access. Contractor shall meet with appropriate VAMC facility personnel to review regulations regarding security-identification of employees, employee-citizenship status, as well as other security and identification-related requirements (including Photo-ID requirements, if any).

F. Prior to commencing work, General Contractor shall provide proof that a OSHA-certified "competent person" (CP) (29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general or subcontractors are present.

G. Training:

1. All employees of general contractor or subcontractors shall have the 10-hour OSHA-certified Construction-Safety course and/or other relevant competency training, as determined by VA CP with input from the ICRA team.
2. Submit training records of all such employees for approval before the start of work.

1.2 STATEMENT OF BID ITEM(S)

A. ITEM I, "Enhance Outpatient Security", A Remodel for: Jonathan M. Wainwright VAMC, Walla Walla WA: Work includes general remodel construction, alterations, security door-hardware system, finishes, mechanical and electrical Work, low-voltage alert-button system, and certain other items as shown or referenced on the drawings and within the specifications.

B. ALTERNATES: No alternates, unless added by addendum.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. AFTER AWARD OF CONTRACT, up to fifteen (15) sets of specifications and drawings will be furnished the Contractor at no cost to the Contractor, if/as requested. These no-cost drawings and specifications may include those returned by prospective subbidders and suppliers, if any.

B. Additional sets of drawings may be purchased from the Architect or the VAMC, at Contractor's expense.

1.4 CONSTRUCTION SECURITY REQUIREMENTS

The applicability of the following provisions regarding this Project shall be established or confirmed prior to beginning Construction Activities:

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.

B. Security Procedures:
   1. 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.
   2. For working outside the "regular hours" as defined in the contract, The General Contractor shall give 3 days notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.

3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency or other event, as deemed appropriate by the VA. The General Contractor may return to the site only with the written approval of the Contracting Officer.

D. Key Control -- To the extent applicable to this Project:
1. The General Contractor shall provide duplicate keys and lock combinations to the Resident Engineer for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. The 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 -- To the extent applicable to this Project:
1. Before starting any work, the General Contractor shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. 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 Site Security Officer immediately when there is a loss or compromise of "sensitive information".
8. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
   a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.

b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

F. Motor Vehicle Restrictions

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

1.5 FIRE SAFETY

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

1. American Society for Testing and Materials (ASTM):
   E84-2008.....Surface Burning Characteristics of Building Materials
2. National Fire Protection Association (NFPA):
   10-2006.....Standard for Portable Fire Extinguishers
   30-2007.....Flammable and Combustible Liquids Code
   51B-2003.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
   70-2007.....National Electrical Code
   241-2004.....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 VAMC's Project Manager for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.

C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.

D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).

E. Temporary Construction Partitions (see also 1.6 G. "**Contractor's Phasing Plan**" below, and coordinate accordingly):

1. Install and maintain temporary construction partitions, if any, to provide dust-proof separations between construction areas and the areas that are described in phasing requirements (see paragraph above) and adjoining areas. Construct temporary 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.
2. As applicable, install temporary construction partitions, if any, to maintain integrity of existing 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 if/as applicable: 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 Project Manager.

H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Project Manager.

I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.

L. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.

M. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Project Manager. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.

N. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Project Manager.

O. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Manager. Obtain permits through Project Manager at least twenty-four hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

P. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Project Manager.

Q. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction.

R. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

S. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

1.6 OPERATIONS AND STORAGE AREAS (See also "1.6 G." below for <u>PHASING PLAN</u>)

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. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

D. Working space and space available for storing materials shall be as determined by the Resident Engineer.

E. Workmen are subject to rules of Medical Center, as applicable to the Workmen's conduct.

E.' Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.

F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by Resident Engineer where required by limited working space.

1. Do not store materials and equipment in other than assigned areas.
2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
3. Where access by Medical-Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.

F'. Utilities Services: If/Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer. All such actions shall be coordinated with the Utility Company involved:

1. 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.

G. Phasing: To insure such executions, Contractor shall furnish the Resident Engineer with a schedule of approximate phasing dates on which the Contractor intends to accomplish work (see "Contractor's Phasing Plan" immediately below). In addition, Contractor shall notify the VAMC's Project Manager two weeks (or as otherwise approved) in advance of the proposed date for changing location of Temporary-Soiled-Utility room. Arrange such phasing/relocation date(s) to insure that accomplishment of this work is mutually agreeable to the Medical-Center Director, the VAMC's Project Manager and the Contractor as follows:

Contractor's Phasing Plan: Contractor shall submit to VAMC's Project Manager for approval, a phasing plan whereby:

1. Clinic Staff shall have continuous access to a room assigned for "Temporary-Soiled-Utility" use. The Contractor can designate any enclosed lockable area within the construction area for such purposes, and it is expected that the location of this Temporary-Soiled-Utility room will change throughout the duration of the Project. Whenever a room is being utilized as the Temporary-Soiled-Utility room, the clinic staff will retain primary use of that room, whereby the Contractor shall only access the Temporary-Soiled-Utility room for necessary incidental Work. Ideally the Contractor would not enter the room designated for Temporary Soiled Utility at all. Nearby area/s may be available for Temporary-Soiled-Utility use—verify with VAMC's Project Manager.

2. Contractor shall address demolition and construction activities surrounding the four Security Doors with respect to normal operation of clinic activities (See H' below).

H'. Building No. 74 will be occupied during performance of work.

1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through all construction areas that serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

2. Immediate areas of alterations that are not mentioned in preceding Subparagraph 1. will be temporarily vacated while such alterations are being performed.

K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Resident Engineer.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of Resident Engineer. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval. Refer to Mechanical and Electrical Specification Sections for additional requirements.
2. Contractor shall submit a request to interrupt any such services to Resident Engineer, in writing, 48 hours in advance of proposed interruption (unless otherwise approved/arranged beforehand). Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days (unless otherwise approved) prior to the desired time and shall be performed as directed by the Resident Engineer.
5. In case of a contract construction emergency, service will be interrupted on approval of Resident Engineer. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam,

payment of such fee shall be the responsibility of the Government and not the Contractor.

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

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. If/as applicable to this Project, the method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Resident Engineer.

N. Coordinate the work for this contract with other construction operations as may be directed by Resident Engineer.

1.7 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the Resident Engineer of areas of buildings in which alterations occur and areas which are anticipated routes of access, and Contractor shall 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, etc., required by drawings to be either reused or relocated, or both.
3. Shall note any discrepancies between drawings and existing conditions at site.
4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Resident Engineer.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Resident Engineer, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by

Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) of Section 00 72 00, GENERAL CONDITIONS.

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and Resident Engineer together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
   1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

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

1.8 INFECTION-PREVENTION MEASURES

The following shall be addressed at the Preconstruction Meeting:

A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.

B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group or as specified here. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to VAMC's Project Manager for review for compliance with contract requirements in

accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.

C. Medical-Center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. In addition:

1. The RE and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.
2. In case of any problem, the Medical Center, along with assistance from the Contractor, shall conduct an environmental assessment to find and eliminate the source.

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

1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by Resident Engineer. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
2. Do not perform dust producing tasks within occupied areas without the approval of the Resident Engineer. For construction in any areas that will remain jointly occupied by the medical Center and Contractor's workers, the Contractor shall:
   a. If/as applicable to this Project, 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. Barriers shall be sealed and made presentable on hospital occupied side. Install a self-closing rated door in a metal frame, commensurate with the partition, to allow worker access. Maintain negative air at all times. A fire retardant polystyrene, 6-mil thick or greater plastic barrier meeting local fire codes may be used where dust control is the

only hazard, and an agreement is reached with the Resident Engineer and Medical Center.

b. HEPA filtration is required where the exhaust dust may reenter the breathing zone. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. Install HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. Insure continuous negative air pressures occurring within the work area. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced to the medical center.

c. Adhesive Walk-off/Carpet Walk-off Mats, minimum 600mm x 900mm (24" x 36"), shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.

d. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as they are created. Transport these outside the construction area in containers with tightly fitting lids.

e. The contractor shall not haul debris through patient-care areas without prior approval of the Resident Engineer and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.

f. Using a HEPA vacuum, clean inside the barrier and vacuum ceiling tile prior to replacement. Any ceiling access panels opened for investigation beyond sealed areas shall be sealed immediately when unattended.

g. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up

and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.

h. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

E. Final Cleanup:

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

1.9 DISPOSAL AND RETENTION

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

1. Reserved items which are to remain property of the Government are to be identified by attached tags or are noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center Cemetery.
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 (if encountered): The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers and capacitors if such are encountered (PCB equipment is not anticipated, therefore additional compensation will be granted for any such Work). The transformers and capacitors shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR),

Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7 also apply. Upon removal of PCB transformers and capacitors for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's Chief.

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

40 CFR 261.....Identification and Listing of Hazardous Waste
40 CFR 262.....Standards Applicable to Generators of Hazardous Waste
40 CFR 263.....Standards Applicable to Transporters of Hazardous Waste
40 CFR 761.....PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions
49 CFR 172.....Hazardous Material tables and Hazardous Material Communications Regulations
49 CFR 173.....Shippers - General Requirements for Shipments and Packaging
49 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

1.10 PROTECTION OF EXIST. VEGETATION, STRUCT., EQUIP., UTIL., & IMPROVEMENTS

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site locations, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, 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 if/as applicable to this Project. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.11 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the Resident Engineer. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the Resident Engineer before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of Section 00 72 00, GENERAL CONDITIONS.

SPEC WRITER NOTE: Check with Project Director to determine if soil report is available at the Medical Center.

1.12 PHYSICAL DATA

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

D. Government does not guarantee that conditions other than those indicated on the drawings or in the specifications will not be encountered nor

that proportions, conditions or character of several materials will not vary from those indicated by explorations. Bidders are expected to examine site of work; and, after investigation, decide for themselves character of materials and conditions, and make their bids accordingly. Upon proper application to Department of Veterans Affairs, bidders will be permitted to make explorations of their own at site regarding existing conditions.

1.13 PROFESSIONAL SURVEYING SERVICES (Not Applicable To This Project)

1.14 LAYOUT OF WORK

A. As applicable to this Project, the Contractor shall lay out the work based on direction established by the Contracting Officer as to existing conditions relative to Work indicated on the drawings, and shall be responsible for all measurements in connection with the layout. 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.

1.15 AS-BUILT DRAWINGS

A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.

B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.

C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.16 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the Resident Engineer, such temporary roads which are necessary in the performance of contract work

(not anticipated for this Project). Any such 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.

1.17 RESIDENT ENGINEER'S FIELD OFFICE (Not Applicable To This Project)

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 Resident Engineer. If the equipment is not installed and maintained in accordance with the following provisions, the Resident Engineer will withdraw permission for use of the equipment.
2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
5. If/as applicable, 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. If/as applicable 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.

B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.

C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

1.19 TEMPORARY USE OF EXISTING ELEVATORS

A. Contractor will not be allowed the use of existing elevators. Outside type hoist shall be used by Contractor for transporting rooftop materials and equipment.

1.20 TEMPORARY USE OF NEW ELEVATORS (Not Applicable To This Project)

1.21 TEMPORARY TOILETS

A'. Contractor may utilize, for use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by Medical Center. 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.

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.

D. Maintain normal operating temperatures throughout the building at all times during by connecting/maintaining to Medical Center heating/cooling distribution system at no cost to Contractor.

E. Electricity (for Construction and Testing): Furnish all temporary electric services required by operations/construction of this Project.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. Electricity for all Project uses is available at no cost to the Contractor, not including Contractor's costs to temporarily connect/disconnect such electricity service.

F. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the Medical Center 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 Resident Engineer's discretion) of use of water from Medical Center's system.

G. Steam: Furnish steam system for testing if/as required in various sections of specifications.

1. Obtain steam for testing by connecting to the Medical Center 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 Resident Engineer's discretion), of use of steam from the Medical Center's system.

1.23 NEW TELEPHONE EQUIPMENT (Not Applicable To This Project)

1.24 TESTS

The following, as applicable--verify/coordinate with Mech./Elec. Specs.:

A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.

B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a complex which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.

D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.

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

1.25 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 (four copies each) for each separate piece of equipment shall be delivered to the Resident Engineer coincidental with the delivery of the equipment to the job site. Manuals

shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the Resident Engineer and shall be considered concluded only when the Resident Engineer is satisfied in regard to complete and thorough coverage. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.26 GOVERNMENT-FURNISHED PROPERTY

A. The Government shall deliver to the Contractor, if any, Government-furnished property shown on the drawings or specified -- see 1.27 below regarding minor items.

B. Equipment furnished by Government to be installed by Contractor will be furnished to Contractor at the Medical Center

C'. Storage space for any such equipment will be provided by the Government, and the Contractor shall be prepared to store the equipment therein upon its receipt at the Medical Center.

1.27 RELOCATED EQUIPMENT AND ITEMS

A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and 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 Resident Engineer.

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.

F. 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 DEPT.-OF-VA EQUIP. (Not Applicable To this Project)

1.29 CONSTRUCTION SIGN (Not Applicable To this Project)

1.30 SAFETY SIGN (Not Applicable To this Project)

1.31 CONSTRUCTION DIGITAL IMAGES (Not Applicable To this Project)

1.32 FINAL ELEVATION DIGITAL IMAGES (Not Applicable To this Project)

1.33 HISTORIC PRESERVATION

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.

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

1-1. Refer also to Articles Section 01 1 00, GENERAL REQUIREMENTS.

1-2. For the purposes of this Contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

1-4. 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.

1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.

1-6. Upon receipt of submittals, Architect-Engineer 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.

1-7. 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.

1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers, and detailed positioning of items.

1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples required by Section 09 06 00, SCHEDULE FOR FINISHES, in quadruplicate. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.

B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, Contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.

1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical, name of Contractor, manufacturer, brand, Contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

D. Approved samples will be kept on file by the Resident Engineer at the site until completion of Contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

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

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

1-10. Samples (except laboratory samples, if any), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to:

James Hoar, Architect
614 Sixth Ave.
Lewiston, ID 83501-2425

1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the Resident Engineer.

1-12. Samples for approval shall be sent to Architect/Engineer, in care of Resident Engineer, VA Medical Center:

Jonathan M. Wainwright Memorial VAMC
77 Wainwright Dr.
Walla Walla, WA 99362

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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:

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Number: (202) 565-5214
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

DHIDoor 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 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

EP-1. DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. The section 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. Much of the following specification does not apply to this Project, although much is applicable, both directly and indirectly. The Contractor is obligated to consider the specified control measures with the costs included within the various contract items of work, as applicable to this Project. "Numbering" of this Specification has been left intact for reference to the standard unaltered VA Specifications.

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.

EP-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.

EP-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

EP-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 commencement of the work, the Contractor shall meet with the Resident Engineer to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Unless otherwise determined during or subsequent to the above meeting, not more than 20 days after the meeting, the Contractor shall prepare and submit to the Resident Engineer 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, as applicable to this Project.

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. 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.

g. Permits, licenses, and the location of the solid waste disposal area.

h. Drawings (or if applicable, other documentation) showing locations of any proposed temporary material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. If applicable (likely not applicable), 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.

i. As applicable, Environmental Monitoring Plans for the job site, including land, water, air, and noise.

j. 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.

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.

EP-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 and as approved by the Resident Engineer.

B. 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. Monitor water areas affected by construction, if any.

C. 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-Washington 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 at all times, including weekends, holidays, and hours when work is not in progress.
2. Particulates Control: Maintain all work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Verify with Resident Engineer and all other Authorities Having Jurisdiction which 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.

D. 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 Resident Engineer. 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 only between the hours permitted by local ordinance and the Resident Engineer. 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

2. 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	
TRUCKS	75	PNEUMATIC TOOLS	80
GENERATORS	75	SAWS	75
PUMPS	75	COMPRESSORS	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.

3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above dB(A) noise level. Measure noise exposure 15 m (50 feet) from the noise source. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. Minimize the effect of reflective sound waves. Submit the recorded information to the Resident Engineer, noting any problems and the alternatives for mitigating actions.

E. 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.

F. 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 Resident Engineer. 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 58 16
TEMPORARY INTERIOR SIGNAGE

PART 1 GENERAL

DESCRIPTION

A. This section specifies temporary interior signs.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNS

A. Fabricate from 50 Kg (110 pound) mat finish white paper.

B. Cut to 100 mm (4-inch) wide by 300 mm (12 inch) long size tag.

C. Punch 3 mm (1/8-inch) diameter hole centered on 100 mm (4-inch) dimension of tag. Edge of Hole spaced approximately 13 mm (1/2-inch) from one end on tag.

D. Reinforce hole on both sides with gummed cloth washer or other suitable material capable of preventing tie pulling through paper edge.

E. Ties: Steel wire 0.3 mm (0.0120-inch) thick, attach to tag with twist tie, leaving 150 mm (6-inch) long free ends.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install temporary signs attached to room door frame or room door knob, lever, or pull for doors on corridor openings.

B. Mark on signs with felt tip marker having approximately 3 mm (1/8-inch) wide stroke for clearly legible numbers or letters.

C. Identify room with numbers as designated on floor plans.

3.2 LOCATION

A. Install on doors that have room, corridor, and space numbers shown.

B. Doors that do not require signs are as follows:

1. Corridor barrier doors (cross-corridor) in corridor with same number.
2. Folding doors or partitions.
3. Toilet or bathroom doors within and between rooms.
4. Communicating doors in partitions between rooms with corridor entrance doors.
5. Closet doors within rooms.

C. Replace missing, damaged, or illegible signs.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.

B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.

C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:

1. Waste Management Plan development and implementation.
2. Techniques to minimize waste generation.
3. Sorting and separating of waste materials.
4. Salvage of existing materials and items for reuse or resale.
5. Recycling of materials that cannot be reused or sold.

D. At a minimum the following waste categories shall be diverted from landfills:

1. Soil.
2. Inerts (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, I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, 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.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS.

B. Lead Paint (if/as applicable): VA Specification Section 02 83 33.13, LEAD BASED PAINT REMOVAL AND DISPOSAL.

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.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 (where approved by the Resident Engineer) 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 Resident Engineer a written demolition debris management plan. Unless otherwise approved by the Resident Engineer 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. Name of 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.

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

2. LEED Green Building Rating System for New Construction

1.7 RECORDS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. List of each material and quantity to be salvaged, recycled, reused.

B. List of each material and quantity proposed to be taken to a landfill.

C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.

B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

C. Hazardous wastes shall be separated, stored, disposed of according to local, State, and 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 receiving parties, dates removed, transport costs, weight tickets, tipping fees, manifests, and invoices. Include the net total cost for each disposal.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel doors, steel frames and related components.

B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

A. Door Hardware: Section 08 71 00, DOOR HARDWARE.

B. Glazing: Section 08 80 00, GLAZING.

C. Card Readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.

D. Wall Framing: Section 09 22 16 NON-STRUCTURAL METAL FRAMING.

E. Gypsum Wallboard (including insulation in doorframe of Door #5): Section 09 29 00 GYPSUM BOARD.

F. Painting: 09 91 00 PAINTING (and 09 06 00 SCHEDULE FOR FINISHES).

1.3 TESTING

A. An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers' Literature and Data:

1. Submit standard Submittal Package for doors and frames, showing conformance with Specifications and compatibility with Project conditions.

1.5 SHIPMENT

A. Prior to shipment, label each door and frame to show location, size, door swing and other pertinent information.

B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

A. Store doors and frames at the site under cover.

B. Protect from rust and damage during storage and erection until completion.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Door and Hardware Institute (DHI):

A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

C. Steel Door Institute (SDI):

114-1979.....Acoustical Performance for Steel Door and Frame Assemblies

A250.8-98.....Standard Steel Doors and Frames

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

A568/568-M-07.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled

A1008-07.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability

D1621-04.....Compressive Properties of Rigid Cellular Plastics

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. The National Association Architectural Metal Manufactures (NAAMM):

Metal Finishes Manual (1988 Edition)

F. National Fire Protection Association (NFPA):

80-08.....Fire Doors and Fire Windows

G. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

H. Intertek Testing Services (ITS):

Certifications Listings...Latest Edition

I. Factory Mutual System (FM): Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

B. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

C. Shop Prime Paint: Meets or exceed requirements of SDI A250.8.

2.2 DOORS

A. FABRICATION, GENERAL:

1. Follow SDI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per SDI A250.8. Door thickness, 44 mm (1-3/4 inches), unless otherwise shown.

a. Door-sheet shall be minimum 18-ga. (0.0478 inch) thickness.

b. All new doors in this Project shall have Polystyrene core. construction, unless otherwise approved by VAMC Project Manager.

c. Prep all doors for Project hardware and for future automatic door operators.

2. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with VAMC-approved core insulation (Polystyrene if feasible; mineral-fiber insulation or other, if not).

B. Standard Duty Doors: SDI A250.8, Level 1, Model 2 or 3, of size and design shown. See above fabrication notes re. sheet thickness, core construction, and prepping of doors.

C. Custom Metal Hollow Doors:

1. Provide custom hollow-metal doors where non-standard steel doors are indicated. At the Contractor's option, custom hollow-metal doors may be provided in lieu of standard steel doors. In that case, door size(s), design, materials, construction, gauges and finish shall be as specified for standard steel doors.

D. Vision Frames (Lites): Shall be Anemostat LOPRO2436 or approved, low-profile vision frame. Prior to ordering, verify frame profile with respect to possible coordination with panic-hardware rod/s.

2.3 Frames

A. General:

1. SDI A250.8, 16-ga.(0.0598 inch) thick sheet steel, types and styles as shown or scheduled.

a. All doors in this Project are subject to have automatic door operators at some time in the future. Therefore all doorframes in this Project shall be prepped (at lip and jamb) for future automatic door operators.

b. At Contractor's option, in lieu of the above prep for future automatic door operators, minimum 15-ga. (0.0673 inch) thick sheet steel may be provided instead of the specified prepped 16-ga. frames.

B. Reinforcement and Covers:

1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.

2. Provide mortar guards securely fastened to back of hardware reinforcements except on lead-lined frames.

C. Terminated Stops: SDI A250.8.

D. Frame Anchors:

1. Jamb anchors (Floor anchors Not required):
   a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart.
   b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.
   c. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.
   d. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

PART 3 - EXECUTION

3.1 DOORFRAME INSTALLATION

A. Coordinate preparation of framed door openings (see 09 22 16, 3.2. E.)

B. Plumb, align and brace frames securely until permanent anchors are set.

1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
3. Protect frame from accidental abuse.
4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

C. Jamb Anchors:

1. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.

D. Frame for Sound-Attenuated Door #5: Coordinate construction to line/fill doorframe with batt or other insulation, as indicated on Drawing E/A1, and as specified in Section 09 29 00.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

A. Install doors and hardware as specified herein (Section 08 11 13, HOLLOW METAL DOORS AND FRAMES) and in Section 08 71 00, DOOR HARDWARE.

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Application of Hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

B. Electronic Security Hardware (and related equipment): Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS (PACS).

C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

D. Painting and Sealants: Section 09 91 00, PAINTING.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

C. The following items shall be of the same manufacturer, if possible, except as otherwise specified:

1. Hinges for hollow metal doors.
2. Exit devices.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Hardware Schedule: Prepare and submit hardware schedule in the following form, or as otherwise approved:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:

1. Samples: Submit samples only if/as requested by VAMC's Project Manager, in addition to all hardware items proposed for the project that have not been previously approved by Builders Hardware Manufacturers Association. Tag and mark all items with manufacturer's name, catalog number and Project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: As applicable, submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.5 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. If requested by VAMC's Project Manager, tag one of each different item of hardware (or selected items) and deliver to Project Manager for reference purposes. Tag shall identify such items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Engineering office until all other similar items have been installed in Project, at which time the Resident Engineer will deliver items on file to Contractor for installation in predetermined locations on the project.

1.6 INSTRUCTIONS

A. Hardware-Set Symbols (Hardware Groups): Hardware requirements for each door are indicated on Hardware Schedule at end of this Section. Symbols for hardware sets consist of letters "HW" followed by a number. Each number designates a set of hardware items applicable to a door type. The applicable Door Numbers for each type of door are listed at the top of each HW set.

B. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Adams-Rite	Adams Rite Mfg. Co.	Glendale, CA
Glynn Johnson	Glynn Johnson Co.	Chicago, IL
LCN	LCN Closers	Princeton, IL
Firemark	Rixon-Firemark Co.	Chicago, IL
Hager	Hager Hinge Company	Saint Louis, MO
Stanley	The Stanley Works	New Britain, CT
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA
Unican	Simplex Security Systems	Collinsville, CT
Von Duprin	Von Duprin Hardware Co.	Indianapolis, IN
Zero	Zero Weather Stripping Co.	New York, NY

C. Keying: At the time that this Specification was written, there were no new locks requiring keys. The Contractor shall direct all keying issues or matters to the VAMC's Project Manager.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

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

F883-04.....Padlocks

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-00.....Butts and Hinges

A156.2-03.....Bored and Pre-assembled Locks and Latches

A156.3-01.....Exit Devices

A156.4-00.....Door Controls (Closers)

A156.5-01.....Auxiliary Locks and Associated Products

A156.6-05.....Architectural Door Trim

A156.8-05.....Door Controls-Overhead Stops and Holders

A156.13-05.....Mortise Locks and Latches Series 1000

A156.16-02.....American National Standard for Auxiliary Hardware

A156.18-00.....Materials and Finishes

A156.23-04.....Electromagnetic Locks (See 28 13 11 PACS)

A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):
101-05.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):
Building Materials Directory (2007)

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Interior Doors: Type 8112 for doors 900 mm (3 feet) wide or less and Type A8111 for doors over 900 mm (3 feet) wide, except see a. below:
   a. Because any or all of Doors #1, #2, #3, #4, and #5 may be retrofitted with automatic door operators at some point/s in the future, all new hinges for these five doors shall be Type A8111 (which is the VA's standard hinge for automatic interior steel doors), regardless of door width. Note: Not all of these doors are scheduled to receive new hinges, and some already require 8111 because of width.

2.2 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer.

2.3 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.

B. Closers shall conform to the following:

1. The closer shall have 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
2. Where specified, closer shall have hold-open feature.
3. Size Requirements: Size closers in accordance with manufacturer's recommendations or provide multi-size closers, sizes 1 through 6.
4. Material of closer shall be forged or cast iron, unless otherwise approved.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Closers shall have full size cover.
7. Closers shall have adjustable hydraulic back-check and separate valves for closing and latching speed.

2.4 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction.

C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.

D. Substitute floor stops Type L02141 or L02161 as appropriate, when wall bumpers would not provide an effective door stop.

E. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

F. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.

2.5 OVERHEAD DOOR HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment.

1. Provide Glynn-Johnson 904H (heavy-duty, hold-open) on Door #5, unless otherwise approved (verify all requirements).

2.6 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.7 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts.

B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13 to the extent applicable to the specific lock referenced below. All locksets and latchsets shall have lever handles similar to Falcon S-lever Design. All locks and latchsets shall be furnished with curved lip strike and wrought box.

a.) Provide mortised privacy lock with "occupancy indicator".

2.8 PUSH-BUTTON COMBINATION LOCKS

A. ANSI/BHMA A156.5, Grade 1. Mechanical operated.

B. Construction: Heavy duty cylindrical lock housing conforming to ANSI/BHMA A156.2, Grade 1. Lever handles and operating components in compliance with the UFAS and the ADA Accessibility Guidelines.

C. Special Features: Key override to permit a master keyed security system and a key activated passage feature to allow access without using the entry code.

1. Coordinate keys and keying with VAMC's Project Manager.

D. Manufacturers:

1. Alarm Lock.
2. Code Locks, LLC
3. Locknetics; an Ingersoll Rand company.
4. Kaba Ilco (Simplex).

2.9 ELECTROMAGNETIC LOCKS - SEE SECTION 28 13 11 PHYSICAL ACCESS CONTROL SYSTEMS (PACS)

2.10 KICK PLATES

A. Conform to ANSI Standard A156.6.

B. Provide protective plates as specified below:

1. Metal kick plates, Type J100 series (verify with paragraph-2. requirements below, paragraph 2. taking precedence), color/finish US10 to match existing.
2. Provide one kick plate for each of two "push" sides of Doors #2 an #4 (i.e. two each for these two double-door openings, four total), on each side of Door #5 (2 total), and on "push" side of Door #6 and existing door to Mech. Closet (two total). Altogether, provide and install eight (8) new kick plates under this Project. Kick plates shall be 356 mm (14 inches) high. Make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors shall have plates 50 mm (2 inches) less than width of each door (on new 3'-4" leafs, kick plate shall be 14"-high x 38"-wide). Extend all other kick plates to within 6 mm (1/4 inch) of each edge of doors, unless otherwise approved.
3. Kick plates are not required on interior side of Door #6.

2.11 EXIT DEVICES

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide surface-mounted, top-rod only, without floor rod or strikes. Provide Von uprin 9927 surface-mounted vertical-Rod exit device, exit-only, and top-rod only.

2.12 THRESHOLDS (only if added by Addendum or Change Order)

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with machine screws and expansion shields. Furnish thresholds for the full width of the openings.

2.13 MISCELLANEOUS HARDWARE (Contact VAMC's Project Manager if such needed)

2.14 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. Miscellaneous Finishes: Below is the VA general standard for hardware similar to that of this Project (for general reference only on this Project), however see "C." below regarding VA standard for existing buildings (remodels):

1. Hinges --interior doors: 652.
2. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color, Dull Brass color, or Bronze color.
3. Thresholds: Mill finish aluminum.
4. Other primed steel hardware: 652.

C. Hardware Finishes for Existing Buildings: On this Project, U.S. Standard finishes shall match finishes of hardware in similar and adjacent existing spaces to the greatest extent possible.

2.15 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following (see paragraph C., immediately above):

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VAMC's Project Manager for approval.

B. Hardware Heights from Finished Floor (see paragraph A. above):
   1. Exit devices centerline of strike (where applicable) 1000 mm (40-5/16 inches).
   2. Locksets and latch sets centerline of strike 1000 mm (40-5/16 inches).
   3. Centerline of door pulls to be 1000 mm (40 inches).
   5. Push plates and push-pull shall be 1250 mm (50 inches) to top of plate.
   5. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted regular arm. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Substitute parallel arm or top jamb mounting for regular arm mounting where the following conditions occur:
   1. Where door swing, in full open position, would be limited to less than 90 degrees due to partition construction and closer location.
   2. Where door to room opens outward into corridor,

C. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)

D. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim.

E. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by Resident Engineer. Existing hinges shall not be reused on door openings

having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

F. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts

G. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish.

H. After locks have been installed; show in presence of Resident Engineer that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the Resident Engineer for his records.) Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 HARDWARE SETS

A. The following sets of hardware correspond to Project Doors (doors are listed **in bold** within parenthesis behind "HW-#"). Only those hardware sets shown below will be required, unless others are added by Addendum or Change Order. Disregard hardware listed in specifications but not shown on Hardware sets, unless added by Addendum or Change Order, or unless otherwise required.

HARDWARE SETS	
HW-1 (**Door #1**, 6070 double HM door) Existing double door to remain, with electronic PACS upgrading per 28 13 11 and with 08 71 00 Hardware as follows: Exit Device per 2.11 above (on Team-C "exiting" side). Verify on-site w/ VAMC's P.M. whether or not to replace closers (replace by C.O.).	Contractor Notes:

HARDWARE SETS	
HW-2 (**Doors #2, #4,** 6870 double HM door; verify width on door #4--may diminish) New double door with electronic PACS per 28 13 11 and with 08 71 00 Hardware as follows: Butts as required (see 2.1 above). Exit Device per 2.11 above (on Team "exiting" side only). Kick Plates per 2.10 above (on "push" side of each leaf). Push Plates: existing push plates to be reinstalled on new doors (verify mounting). Closers: Verify on-site w/ VAMC's P.M. whether to reinstall existing closers or to replace existing closers with new (replace by material-only C.O.; closer labor under this Project's Contract Amount). Stop/Hold-Open Devices at/near floor level: Verify on-site w/ VAMC's P.M. whether to reinstall all such existing devices or to replace existing with new (replace by material-only C.O.; all device labor under this Project's Contract Amount).	Contractor Notes:
HW-3 (**Door #3,** 3670 HM door) Existing door to remain, with electronic PACS upgrading per 28 13 11 and with 08 71 00 Hardware as follows: Verify on-site w/ VAMC's P.M. whether or not to replace closer (replace by C.O.). Stop/Hold-Open Device at/near floor level: Verify on-site w/ VAMC's P.M. whether or not to replace device (replace by C.O.).	Contractor Notes:

HARDWARE SETS	
HW-4 (**Door #5**, new 3070 HM door to Restroom) Butts as required (see 2.1 above). Lock per 2.7 B. 1. a.) above, mortised privacy lock with "occupancy indicator". Overhead Stop per 2.5 above (closer not allowed on this door). Floor Stop: Provide additional floor door stop to further protect door from corner guard, per 2.4 D. above (locate on-site with VAMC's P.M.). Kick Plates per 2.10 above (on both sides of door).	Contractor Notes:
HW-5 (**Door #6**, new 3070 HM door to Soiled Utility) Butts as required (see 2.1 above). Lock per 2.8 above, push-button combination lock (see "Verify" note on HW-6 below). Closer per 2.3 above. Wall Stop per 2.4 above. Kick Plate per 2.10 above (on push side of door).	Contractor Notes:
HW-6 (**Existing Door to Mech. Closet**) Kick Plate per 2.10 above (on push side of door). Verify on-site w/ VAMC's P.M. whether or not to replace existing push-button lock with lever lock, and if so, then whether or not to use existing push-button lock on Door 6, HW-5 (in lieu of new push-button lock there). Any such lock replacement and/or substitution shall be accomplished by C.O.).	Contractor Notes:

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SECTION 28 13 11
PHYSICAL ACCESS CONTROL SYSTEM (PACS)

PART 1 – GENERAL

1.1 DESCRIPTION

A. Provide and install a Physical Access Control System at four doors, hereinafter referred to as the PACS. See Drawing Sheet A-1, "'F' Security Doors" and "'A' Reference Plan".

1.2 RELATED WORK

A. For General Requirements, see Section 01 00 00, GENERAL REQUIREMENTS.

B. Regarding Hollow-Metal Doors and Door Frames, see Section 08 11 13 STEEL DOORS and FRAMES.

C. Regarding mechanical non-electronic Door Hardware, see Section 08 71 00 DOOR HARDWARE.

D. Regarding labeling and signs, see "Signs" note on F/A1 (Drawing Sheet).

E. Regarding power cables, see Electrical Specification Section 16127 CABLES, LOW VOLTAGE (600 VOLTS AND BELOW).

F. Regarding grounding of equipment, see Section 16450, GROUNDING.

G. Regarding general electrical infrastructure, see Sections 16050 BASIC METHODS AND REQUIREMENTS (ELECTRICAL), 16111 CONDUIT SYSTEM, AND 14140 WIRING DEVICES.

1.3 QUALITY ASSURANCE

A. The term "Contractor" in this entire Section 28 13 11 also refers to "Security Subcontractor", and the inherent responsibilities are intended and shared to the same extent as with any other Project Subcontractor. Refer to Section 01 00 00 General Requirements and all other Contractual Documents if questions arise regarding specific responsibilities. In general, the term "Contractor" in this Section 28 13 11 refers to the "Security Subcontractor".

B. The Contractor shall be responsible for providing, installing, and the operation of the PACS as shown. The Contractor shall also provide certification if/as required.

C. The security system will be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the security system is stand-alone or a part of a complete Information Technology (IT) computer network.

D. The Security Subcontractor shall be a licensed security Contractor as required within the state or jurisdiction of where the installation Work is being conducted.

E. See also: 3.1 R. "Supplemental Contractor Quality Control" below; and 3.2 "Testing and Training" at end of this Section 28 13 11.

1.4 SUBMITTALS

A. Submit below items in conjunction with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.

B. Provide certificates of compliance with Section 1.3, Quality Assurance, if/as required by the VA.

C. Provide a complete and thorough pre-installation and as-built design package in both electronic format and on paper. Drawing submittals shall be per the established project schedule.

D. Pre-installation design and as-built packages shall include, but not be limited to:

1. Index Sheet that shall:
   a. Include facility name, building name/number.
   b. Provide a complete list of all security abbreviations and symbols.
   c. Reference all general notes that are utilized within the design package.
   d. Specification and scope of work pages for all individual security systems that are applicable to the design package that will:
      1) Outline all general and job specific work required within the design package.
      2) Provide a detailed device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
2. Drawing sheet/s that will be plotted in floor-plan format shall:
   a. Include a title block as defined above.
   b. Clearly define the drawings scale in both standard and metric measurements.
   c. Provide device identification and location.
   d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
   e. Identify all pull box and conduit locations, sizes, and fill capacities.

f. Address all general and drawing specific notes for a particular drawing sheet.

3. A detailed riser drawing for each applicable security subsystem shall:
   a. Indicate the sequence of operation.
   b. Relationship of integrated components on one diagram.
   c. Include the number, size, identification, and maximum lengths of interconnecting wires.
   d. Wire/cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire/cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer's name and part number for the wire/cable being installed.
4. A detailed system drawing for each applicable security system shall:
   a. Clearly identify how all equipment within the system, from main panel to device, shall be laid out and connected.
   b. Provide full detail of all system components wiring from point-to-point.
   c. Identify wire types utilized for connection, interconnection with associate security subsystems.
   d. Show device locations that correspond to the floor plans.
   e. All general and drawing specific notes shall be included with the system drawings.
5. A detailed schedule for all of the applicable security subsystems shall be included. All schedules shall provide the following information:
   a. Device ID.
   b. Device Location (e.g. room number, location).
   c. Mounting type (e.g. flush, wall, surface, etc.).
   d. Power supply or circuit breaker and power panel number.
   e. In addition, for the PACS, provide the door ID, door type (e.g. wood or metal), locking mechanism (e.g. strike or electromagnetic lock) and control device (e.g. card reader or biometrics).
6. Detail and elevation drawings for all devices that define how they were installed and mounted.

E. Pre-installation design packages shall go through a full review process conducted by the Contractor along with a VA representative to ensure all work has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule. There shall be four (4) stages to the review process unless otherwise approved by the VAMC's Project Manager:

Stage 1. 35 percent

Stage 2. 65 percent

Stage 3. 90 percent

Stage 4. 100 percent

F. Provide manufacturer security system product cut-sheets. Submit for approval at least 30 days prior to commencement of formal testing, a Security System Operational Test Plan. Include procedures for operational testing of each component and security subsystem, to include performance of an integrated system test.

G. Submit manufacture's certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below (including amendments, addenda, revisions, supplement, and errata) form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute (ANSI)/ Security Industry Association (SIA):

AC-01.....Access Control: Wiegand Card Reader Interface Standard

AC-03.....Access Control: Badging Techniques

C. American National Standards Institute (ANSI)/ International Code Council (ICC):

A117.1.....Standard on Accessible and Usable Buildings and Facilities

D. Department of Justice American Disability Act (ADA)

28 CFR Part 36-90.....ADA Standards for Accessible Design

E. National Electrical Manufactures Association (NEMA):

250-03.....Enclosures for Electrical Equipment (1000 Volts Maximum)

F. National Fire Protection Association (NFPA):

70-05..... Article 780-National Electrical Code

G. Underwriters Laboratories, Inc. (UL):

294-99.....Standard for Access Control

305-97.....Standard for Panic Hardware

1981-03.....Central Station Automation System

H. Homeland Security Presidential Directive (HSPD):

HSPD-12.....Policy for a Common Identification Standard for Federal Employees and Contractors

I. Federal Information Processing Standards (FIPS), if/as applicable (verify with VAMC's Project Manager):

FIPS-201.....Personal Identity Verification (PIV) of Federal Employees and Contractors

J. National Institute of Standards and Technology (NIST):

IR 6887 V2.1.....Government Smart Card Interoperability Specification (GSC-IS)

Special Pub 800-96.....PIV Card Reader Interoperability Guidelines

K. Institute of Electrical and Electronics Engineers (IEEE):

C62.41.....IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

L. International Organization for Standardization (ISO):

7810.....Physical Characteristics of Credit Card Size Document

7811.....Physical Characteristics for Magnetic Stripe Cards

7816-1.....Physical Characteristics of the Card

7816-2.....Dimensions and Contact Position of the card

7816-3.....Electrical Signals and Transmission Protocols

7816-4.....Inter-Industry Command for Interchange

14443.....RFID cards; Contactless Proximity Cards Operating at 13.56 MHz in up to 5 inches distance

15693.....RFID cards; Contactless Vicinity Cards Operating at 13.56 MHz in up to 50 inches distance

M. Uniform Federal Accessibility Standards (UFAS) 1984

N. ADA Standards for Accessible Design 1994

1.6 WARRANTY OF CONSTRUCTION.

A. Warrant PACS work subject to VAMC's Project Manager's requirements (verify with VAMC Project Manager before bidding).

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment associated within the PACS shall be UL 294 compliant and rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.

B. All equipment shall operate on a 120 or 240 volts alternating current (VAC); 50 Hz or 60 Hz AC power system unless documented otherwise in subsequent sections listed within this specification or approved by VAMC's Project Manager.

C. The system shall be designed, installed, and programmed in a manner that will allow for easy of operation, programming, servicing, maintenance, testing, and upgrading of the system.

D. If applicable (verify with VAMC's Project Manager), all equipment and materials for the system will be compatible to ensure correct operation as outlined in FIPS 201, March 2006 and HSPD-12.

2.2 EQUIPMENT ITEMS

A. The security system characteristics listed in this section will serve as a guide in selection of equipment and materials for the PACS. If updated or more suitable versions are available then the VAMC Project Manager will approve the acceptance prior to an installation (utilize normal Submittal process for acceptance).

B. PACS equipment shall meet or exceed all requirements listed below.

C. The PACS shall be comprised of, but not limited to, the following components:

1. Control/Communications Panel/s
2. Electronic Security Management System
3. Card Reader and Credential Cards/Badges
4. Portal Control Devices (including Door Status Indicator/s)
5. Entry Control Device/s
6. Power Supplies
7. Wires and Cables

D. Control/Communications Panel/s (See item 8. below):

1. Shall be a central point provided for monitoring, controlling, and programming the PACS.
2. Shall be expandable and provide a means of networking multiple panels to provide overall control of all doors on the PACS via a primary panel.
3. Shall be system specific addressable, Internet Protocol (IP) addressable, and programmable via a computer.
4. Shall be able to be interfaced directly from a computer or via the Internet or Intranet. Access to the panels shall be password protected. All individuals with access to the panels shall have a user-specific password.
5. The operating system for the panel must utilize a single seamlessly integrated relational database for all functionality. This integration shall be provided with one operating environment. The operating environment shall be the fully multi-tasking multi-threading Microsoft Windows 2003 Server, Windows 2000 Server SP4, Windows 2000 Professional SP4, or Windows XP SP2 Operating System.
6. The panel's web-enabled client applications shall be capable of running on independent client operating systems including Windows 2003 Server, Windows 2000 Server SP4, Windows 2000 Professional SP4, or Windows XP SP2, Windows NT, Windows 98, Windows 95, Macintosh, UNIX, Linux, and Solaris. The web-enabled applications shall utilize the same common database as the other system modules.
7. As applicable, the panel programming shall be written so that all system modules (e.g. access control, alarm monitoring, credential management, etc.) are developed and built from a unified 32-bit source code set. There absolutely shall not be separate source code bases for the individual modules of the PACS.
8. Shall consist of or have the equivalent of, at a minimum, a General-Control Module and an Access-Control Module, and shall be programmable via a computer.
9. The General-Control Module (Project unit shall be *Honeywell "Pro 2200" Series Master Control Panel*, or as otherwise approved by VAMC Project Manager) shall:
   a. Provide for full distributed processing of access-control operations.
   b. Store the following information and function using a high speed, local 32-bit microprocessor:

1) access levels
2) hardware configurations
3) programmed alarm outputs assigned at an administration client workstation

c. Process all access granted/denied decisions to provide fast responses to proximity-reader transactions. As a standard, a fully configured general-control module with 64 proximity readers shall require less than one-half (0.5) seconds to grant access to an authorized cardholder, or deny access to an unauthorized cardholder.

d. Meet the following minimum requirements:
1) A minimum host communications speed of 115,200 bps.
2) Support direct-connect connections.
3) Local Area Network (LAN) Support RJ45 (10/100baseT).
4) Support of multiple card technologies.
5) Supervised Communications with PACS system software.
6) Support multiple card formats and facility codes.
7) Integration with all approved manufacturers' card readers.
8) 12 VAC or 12 volts direct-current (VDC) input power via a UL-certified step-down transformer or power supply.
9) Issue Code Support for Corp-1000 or Wiegand Card Formats.
10) Status LED's to identify normal component and communication status.

10. The Access-Control Module shall (Note: the *Honeywell* unit specified in Item 9. above has both the General-Control and Access-Control functions specified herein; see Item 8. above re. "equivalent"):

a. Have full control of doors, utilizing input and output relays that are fully programmable via network software (open-platform format).

b. Input functions shall meet the following minimum requirements:
1) Provide analog unsupervised alarm input zones to monitor and report alarm conditions, power faults, and tampers.
2) Operate independently and in conjunction with output functions, which will send an output signal to a corresponding output device upon alarm input activation. Once an alarm has been received, the input relay shall activate any or all alarm outputs.
3) Contain the following features:

a) Alarm contact status scanning.

b) Filtered data for noise rejection to prevent false alarms.

11. Output functions shall meet the following minimum requirements:
    a. Shall be capable of controlling a corresponding output device upon any input activation or on command from the PACS.
    b. Shall be capable of responding to:
        1) Input alarms.
        2) Commands from a System Operator.
        3) Time zone control commands for automatic operation.
    c. Shall be capable of:
        1) Pulsing for a predetermined duration. Duration shall be programmable for each relay individually.
        2) Responding on command from the System Operator to pulse, command on, command off, or reset to normal state.
        3) Operating outputs rated at 5 amps (A) @ 30 VDC.

E. Electronic Security Management System (SMS); "*Win Pac* Professional Edition" (WIN PAK PRO 2005), or as otherwise approved by VAMC Project Manager:
1. Shall allow the configuration of an enrollment and badging, alarm monitoring, administrative, asset management, digital video management, intrusion detection, visitor enrollment, remote access level management, and integrated client workstations or any combination of all or some
2. Shall be expandable to support an unlimited number of individual module or integrated client workstations. All access control field hardware, including Intelligent System Controllers (ISC), shall be connected to all Windows 2003 Server, Windows 2000 Server SP4, Windows 2000 Professional SP4, or Windows XP SP2 access-control-system workstation on the network (including most-current edition of Pro XP).
3. Shall have the ability to compose, file, maintain, update, and print reports for either individuals or the system as follows.
    a. Individual reports that consist of an employees name, office location, phone number or direct extension, and normal hours of operation. The report shall provide a detail listing of the employee's daily events in relation to accessing points within a facility.

b. System reports shall be able to produce information on a daily/weekly/monthly basis for all events, alarms, and any other activity associated with a system user.

c. All reports shall be in a date/time format and all information shall be clearly presented.

4. Shall be designed to allow it to work with any industry standard network protocol and topology listed below:
   a. Transmission Control Protocol (TCP)/IP
   b. Novell Netware (IPX/SPX)
   c. Banyan VINES
   d. IBM LAN Server (NetBEUI)
   e. Microsoft LAN Manager (NetBEUI)
   f. Network File System (NFS) Networks
   g. Remote Access Service (RAS) via ISDN, x.25, and standard phone lines.
5. Shall provide full interface and control of the PACS to include the following subsystems within the PACS:
   a. Public Key Infrastructure
   b. Card Management
   c. Identity and Access Management
   d. Personal Identity Verification
6. Shall have the following compatibilities:
   a. The ability to be operated locally or remotely via a LAN, WAN, internet, or intranet.
   b. Event Monitoring.
   c. Database Partitioning.
   d. Ability to fully integrate with all other security subsystems .
   e. Enhanced Monitoring Station with Split-Screen Views.
   f. Alternate and Extended Shunt by Door.
   g. Escort Management.
   h. Enhanced IT-based Password Protection.
   i. N-man Rule and Occupancy Restrictions.
   j. Open Journal Data Format for Enhanced Reporting (SQL Data Base).
   k. Windows 2003 Server, Windows 2000 Server SP4, Windows 2000 Professional SP4, or Windows XP SP2.
   l. Field-Level Audit Trail.
   m. Cardholder Access Events.

7. For the SMS network, the VAMC shall provide a server and a client workstation that meet the Security Subcontractor's system (PACS) requirements. Security Contractor shall verify and coordinate with VAMC accordingly. VA shall also provide standard in-house uninterrupted power source (UPS).

F. Card Readers and Credential Cards (Note: Card Readers are referred to as "Proximity Reader" and "PR" on the Drawings):

1. Shall be utilized for controlling the locking hardware on a specific door, and allow for reporting back to the main control panel with the time/date that the door was accessed, and the name of the person accessing the door.
2. Will be fully programmable and addressable, locally and remotely, and hardwired to the system.
3. Shall be individually home run to the main panel.
4. Shall be installed in a manner that they comply with:
   a. The Uniform Federal Accessibility Standards (UFAS)
   b. The Americans with Disabilities Act (ADA)
   c. The ADA Standards for Accessible Design
5. The PACS shall be capable of supporting a variety of card readers that encompass a wide functional range. The PACS shall be capable of combining any of the card readers described below for installations requiring multiple types of card readers (for example, card only, card and/or PIN, card and/or biometrics, card and/or pin and/or biometrics, supervised inputs, etc.). Such card readers shall be available in the approved technology to meet ISO 14443 A or B compliant. The reader output can be Wiegand, RS-22, 485 or TCP/IP.
6. Are to be housed in an aluminum bezel with a wide lead-in for easy card entry.
7. Shall contain read head electronics, and a sender to encode digital door control signals.
8. LED's shall be utilized to indicate card reader status and access status (confirm).
9. Shall be able to support a user defined downloadable off-line mode of operation (e.g. locked, unlocked, or facility code), which will go in effect during loss of communication with the main control panel.
10. Shall provide audible feedback to indicate access granted/denied decisions (verify).

11. Shall have a minimum of two programmable inputs and two programmable outputs (verify).
12. Card readers shall come in one or more of the following formats if/as approved by the VAMC's Project Manager. Provide *Honeywell* Model HU\5355AGN00 (measuring approximately 5"x5"x1"), or as otherwise approved by VAMC's Project Manager):
    a. Wiegand Card Reader:
        1) Shall be utilized during the transition from the existing technology to the contactless smart card technology.
        2) Shall read credential cards which are encoded using Wiegand effect ferromagnetic wires laminated into the credential card.
        3) Shall create a magnetic field and output a coded representation of the unique pattern of magnetic flux changes produced by moving the credential card through the card reader.
        4) The output shall be a series of electrical signals and shall constitute a unique identification code number.
        5) Wiegand credential cards shall use at least 24 binary digits to generate a unique credential card identification code.
        6) The card reader shall meet or exceed the following technical characteristics:

Card Speed	5 to 30 inches (203 to 1270mm) per second
Data Rate	1ms per bit
Power	Per Manufacturers Specifications
Lifetime	600,000 pass read head
Error Rate	false accept
Static Discharge	Withstands 20,000 volts
LED	If required per the design package
Card Output Format	EMPI 26 or 34-bit ANSI/ABA All bits Clock-and-Data up to 37 characters 10 Digit ANSI/ABA 26, 34, or 36-bit

    b. Contactless Smart Cards and Readers:
        1) Smart card readers shall read credential cards whose characteristics of size and technology meet those defined by ISO/IEC 7816, 14443, 15693.

2) The readers shall have "flash" download capability to accommodate card format changes.
3) The card reader shall have the capability of reading the card data and transmitting the data to the main monitoring panel.
4) The card reader shall be contactless.

c. Proximity (PROX) Card Reader:
1) Shall use active/passive proximity detection and shall not require contact with the proximity credential card for operation.
a) Active detection proximity card readers shall provide power to compatible credential cards through magnetic induction and receive and decode a unique identification code number transmitted from the credential card.
b) Passive detection proximity card readers shall use a swept-frequency, radio frequency field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
2) Shall read proximity cards in a range from 0 to at least six (6) inches (0 to at least 15 cm) from the reader. The credential card design shall allow for a minimum of 32,000 unique identification codes per facility.
3) Shall be able to read cards from two (2) inches (5cm) to 6 inches (15cm).
4) The operating frequency shall be determined by the type of access control system being utilized.

G. Portal Control Devices (as applicable to this Project):
1. Shall be used to assist the PACS.
2. Such devices shall:
a. Provide a secondary means of access control to a secure area (see 5. below).
b. Provide a means of monitoring the doors status (see 6. below).
c. Allow for exiting a space via request to exit (see 7. below).
3. Shall be connected to and monitored by the main PACS panel.
4. Shall be installed in a manner that they comply with:
a. The Uniform Federal Accessibility Standards (UFAS)
b. The Americans with Disabilities Act (ADA)
c. The ADA Standards for Accessible Design

5. Push-Button Switches; provide *Honeywell* R9300-US28 Momentary Exit Switch (aluminum), or as otherwise approved by VAMC's Project Manager:
   a. On Drawings, push-button switches are referred to as "PB" and "Remote Push-Button Release".
   b. Shall be momentary-contact push buttons, and have switch enclosures for each push button where shown (see Drawing A/A1 Reference Plan). Buttons are to be utilized for secondary means of releasing a locking mechanism.
   c. In an area where a push button is being utilized for remote access of the locking device then no more than two (2) buttons shall operate one door from within one secure space. Buttons will not be wired in series with one other.
   d. In an area where locally stationed guards control entry to multiple secure points via remote switches, an interface board shall be designed and constructed for only the number of buttons it shall house. These buttons shall be flush mounted and clearly labeled for ease of use. All buttons shall be connected to the PACS and SMS system for monitoring purposes.
   e. Shall have double-break silver contacts that will make 720 VA at 60 amperes and break 720 VA at 10 amperes.
6. Door-Status Indicators:
   a. Shall monitor and report door status to the SMS.
   b. Door-Position Sensor; provide *Sentrol* 1078 units, or as otherwise approved by VAMC's Project Manager. Note: On Drawings, door-position sensor also referred to as "DPS" and "Door-Position Switch".
   c. Shall provide an open or closed indication for all doors operated on the PACS and report directly to the SMS.
   d. Shall also provide alarm input for all doors operated by the PACS.
   e. Switches for doors operated by the PACS shall be single-pole single-throw (SPST).
   f. Shall be surface- or flush-mounted.
7. Request-to-Exit (RTE) *Kantech* brand, Model TRX-LT2:
   a. On Drawings, RTE are also referred to as "R-EMD" and "Request-to-Exit Motion Detector".

b. Shall be utilized to de-energize the locking hardware on a door to allow for exiting a secure area.

c. Shall be either an infrared sensor or as otherwise approved.

H. Entry Control Devices:

1. Shall be hardwired to the PACS main control panel and operated by a card reader via a relay on the main control panel.
2. Shall be fail-safe in the event of power failure to the PACS system.
3. Shall operate at 24 VCD, and be powered by a separate power supply dedicated to the door control system. Each power supply shall be rated to operate a minimum of two doors simultaneously without error to the system or overload the power supply unit.
4. Shall have a diode or metal-oxide veristor (MOV) to protect the controller and power supply from reverse current surges or back-check.
5. Electromagnetic Locks (*Securetron* brand or as otherwise approved by VAMC's Project Manager):

   a. These locks shall be without mechanical linkage utilizing no moving parts, and securing the door to its frame solely on electromagnetic force.

   b. Shall be comprised of two pieces, the mag-lock and the door plate. The mag-lock shall be surface mounted to the door frame and the door plate shall be surface mounted to the door.

   c. Ensure a diode or MOV is installed in line with the DC voltage supplying power to the unit in order to prevent back-check on the system when the mag-lock is powered.

   d. Shall utilize a magnetic bonding sensor (MBS) to monitor the door status and report that status to the SMS.

   e. Verify and accommodate minimum technical characteristics.

I. Power Supplies:

1. Shall be UL rated and able to adequately power entry-control devices on a continuous base without failure; shall be battery-back-up for eight (8) hours.
2. Shall meet the following minimum technical characteristics:

INPUT POWER	110 VAC 60 HZ (verify amp)
OUTPUT VOLTAGE	12 VDC Nominal (13.8 VDC) 24 VDC Nominal (27.6 VDC)

	Filtered and Regulated

J. Wires and Cables (requirements as applicable to Project):

1. Shall meet or exceed the manufacturers' recommendations for power and signal.
2. All wiring and cables below ceiling level shall be carried by raceway or within walls.
3. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a high security office space will contained in either EMT or RGS conduit.
4. All conduit, pull boxes, and junction boxes shall be clearly marked every with colored permanent tape or paint that will allow it to be distinguished from all other conduit and infrastructure.
5. Conduit fills shall not exceed 50 percent unless otherwise documented.
6. Within conduit, pull rope shall be pulled along with signal and power cables to assist in future work.
7. At all locations where core drilling is conducted to allow for conduit to be installed, then fire stopping shall be applied to that area.
8. High power and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High power for the security system shall be defined as any cable or sets of cables carrying 30 VDC/VAC or higher.
9. Signal Cables:
   a. Shall meet or exceed all specifications and requirements called out by the manufacturers.
   b. Shall be twisted pairs.
   c. All cables and conductors, except fiber optic cables, that act as a control, communication, or signal lines shall include surge protection. Surge protection shall be furnished at the equipment end and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 3 feet, (1 meter) of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:

1) A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and peak current of 60 amperes.
2) An 8 microsecond rise time by 20 microsecond pulse width wave form with a peak voltage of 1000 volts and peak current of 500 amperes.

10. Power Cables:
    a. See Electrical Drawings for dedicated circuit to MCP and Power Supply that shall be hardwired to PACS equipment. Security Subcontractor shall coordinate with Project Electrical Subcontractor to confirm and coordinate all PACS-related requirements and features.
    b. Shall be rated for either 110 or 220 VAC, 50 or 60 Hz, and shall comply with VA Master Spec 26 05 21 Low Voltage Electrical Power Conductors and Cables (600 Volts and Below).
    b. Shall be sized according and comply with the NEC. High voltage power cables will be a minimum of three conductors, 14 AWG, stranded, and coated with a non-conductive polyvinylchloride (PVC) jacket.
    c. Low Voltage Power Cables:
        1) All cables shall be a minimum of 18 AWG, Stranded and have a polyvinylchloride outer jacket.
        2) Specific cable size shall determined using a basic voltage over distance calculation and shall comply with the NEC's requirements for low voltage cables.
    d. All equipment connected to AC power shall be protected from surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41. Fuses shall not be used as a means of surge protection.

PART 3

3.1 INSTALLATION

A. System installation shall be in accordance with manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.
B. Components shall be configured with appropriate "service points".
C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.4 and

1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a operable system.

D. The PACS will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a stand alone or a network.

E. For integration purposes, the PACS shall be capable of being integrated where appropriate with the following associated security subsystem/s:
   1. EPPS (re. alert-button-alarm-system portion of this Project):
      a. Be programmed to go into an alarm state when an emergency call box or duress alarm/panic device is activated, and notify the Access Control System and Database Management of an alarm event.
      b. For additional PACS requirements as they may relate to the EPPS, refer to Section 16763, ALERT BUTTON ALARM SYSTEM.

F. Integration with security subsystem/s shall be achieved by computer programming or the direct hardwiring of the systems.

G. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.

H. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the VAMC's Project Manager in the form of a report. The Contractor shall not take any corrective action without written permission received from the VAMC's Project Manager.

I. Existing Equipment:
   1. The Contractor shall connect to, and utilize, any existing door equipment, control-signal transmission lines, and devices as may be outlined in the design package. Door equipment and signal lines that are usable in their original configuration without modification may be reused with VAMC's Project Manager's approval.
   2. The Contractor shall perform a field survey, including testing and inspection of all existing door equipment and signal lines intended to be incorporated into the PACS, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report)

specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.

3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving VAMC's approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.
4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or improper installation of equipment.
5. The VAMC's Project Manager shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced, based upon approval of the VAMC's Project Manager, after reviewing the equipment removal list. In all areas where equipment is removed or replaced, the Contractor shall repair those areas to match the current existing conditions.

J. Enclosure Penetrations (verify applicability of this paragraph on site, primarily interior Work only): All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and will comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.

K. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

L. Control Panels:

1. Connect power and signal lines to the controller.

2. Program the panel as outlined by the design and per the manufacturer's programming guidelines.

M. SMS:

1. Coordinate with the VA agency's IT personnel to place the computer on the local LAN or Intranet and provide the security system protection levels required to insure only authorized VA personnel have access to the system.
2. Program and set-up the SMS to ensure it is in fully operation.

N. Card Readers:

1. Connect all signal inputs and outputs as shown and specified.
2. Terminate input signals as required.
3. Program and address the reader as per the design package.
4. Readers shall be surface or flushed mounted and all appropriate hardware shall be provided to ensure the unit is installed in an enclosed conduit system where applicable (see 2.2 M. 2. above).

O. Portal Control Devices:

1. Install all signal input and output cables as well as all power cables.
2. Devices shall be surface or flush mounted as per the design package.
3. Program all devices and ensure they are working.
4. Door position sensors shall be surface or flush mounted with the ability to operate at a maximum distance of up to 2" (5 cm).
5. Request-to-Exit Device (RTE/R-EMD) shall be surface mounted and angled in a manner that they cannot be compromised from the non-secure side of a windowed door, or allow for easy release of the locking device from a distance no greater than 6 feet from the base of the door.

P. Entry Control Devices:

1. Install all signal input and power cables.
4. Electromagnetic locks shall be installed with the mag-lock mounted to the door frame and the metal plate mounted to the door.
   a. Locking mechanisms shall be located on the secure side in all instances (see F/A1 Security Door plans and verify).

Q. System Start-Up:

1. The Contractor shall not apply power to the PACS until the following items have been completed:
   a. PACS equipment items and have been set up in accordance with manufacturer's instructions.

b. A visual inspection of the PACS has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.

c. System wiring has been tested and verified as correctly connected as indicated.

d. All system grounding and transient protection systems have been verified as installed and connected as indicated.

e. Power supplies to be connected to the PACS have been verified as the correct voltage, phasing, and frequency as indicated.

2. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.

R. Supplemental Contractor Quality Control:

1. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed PACS; and are approved by the Contracting Officer.

2. The Contractor will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.

3. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.

4. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.2 TESTING AND TRAINING

All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, GENERAL REQUIREMENTS.

-----END----

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies glass, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

A. Factory glazed by manufacturer in following units:
   1. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
   2. Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.
   3. Mechanical and Electrical Work, Divisions 15 and 16.

1.3 LABELS

A. Temporary labels:
   1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
   2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
   3. Temporary labels shall remain intact until glass is approved by Resident Engineer.

B. Permanent labels:
   1. Locate in corner for each pane.
   2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
      a. Tempered glass.
      b. Laminated glass or have certificate for panes without permanent label.

1.4 PERFORMANCE REQUIREMENTS

A. Glass Thickness:
   1. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   2. Test in accordance with ASTM E 330.
   3. Thicknesses listed are minimum thicknesses. Coordinate thicknesses with framing system manufacturers.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Warranty: Submit written guaranty, conforming to General Condition requirements, and to "Warranty of Construction" Article in this Section.

C. Manufacturer's Literature and Data:
   1. Glass, each kind required.
   2. Glazing cushion.
   3. Sealing compound.

D. Samples (if requested):
   1. Glass Size: 150 mm by 150 mm (6 inches by 6 inches).
   2. Accessories: As requested. See "Color" near end of Part 2 below.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect laminated security glazing units, if any, against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":
   1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling shall comply with Manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.
   2. Temporary protections: The glass front and polycarbonate/Noviflex back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack

polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.

3. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.
4. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

A. Field Measurements (if/as applicable re. coordination with Door Manufacturer and/or Supplier): Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
   1. Laminated glass units, if any, to remain laminated for 5 years.

1.9 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American National Standards Institute (ANSI):

Z97.1-04.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

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

C1363-05.....Thermal Performance of Building Assemblies, by Means of A Hot Box Apparatus

C542-05.....Lock-Strip Gaskets.

C716-06.....Installing Lock-Strip Gaskets and Infill Glazing Materials.

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C920-05.....Elastomeric Joint Sealants.

C1036-06.....Flat Glass.

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C1172-03.....Laminated Architectural Flat Glass.

C1349-04.....Architectural Flat Glass Clad Polycarbonate.

D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position.

E84-01.....Surface Burning Characteristics of Building Materials.

D. Commercial Item Description (CID):

A-A-59502.....Plastic Sheet, Polycarbonate

E. Code of Federal Regulations (CFR):

16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 1977, with 1984 Revision.

F. National Fire Protection Association (NFPA):

80-06.....Fire Doors and Windows.

G. National Fenestration Rating Council (NFRC):

Certified Products Directory (Latest Edition).

H. Safety Glazing Certification Council (SGCC):

Certified Products Directory (Issued Semi-Annually).

PART 2 - PRODUCT

2.1 GLASS, GENERAL

A. IMPORTANT: Glass Supplier shall verify the type of glazing that will qualify as safety glazing for this Project's specific door-lite applications (location/s, lite size/s, thickness/es, etc.), under all applicable regulations. Contractor shall not use any glazing type that fails to meet all applicable regulations, even if such a glazing type may be specified or otherwise indicated in this Section 08 80 00. This Section 08 80 00 is intended only as a general guide for glazing, of which all glazing aspects are to be clarified and confirmed by the Project Glazing Supplier.

B. Use thickness stated below, unless specified otherwise in assemblies or otherwise as superseded by Code requirement or other applicable regulation. Thicknesses below are minimum thicknesses

2.2 HEAT-TREATED GLASS

A. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch).

2.3 LAMINATED GLASS (if/as allowed)

A. Interlayer between glass panes: ASTM C 1172. Use heat and light stable polyvinyl butyral (PVB) plasticized resin sheeting.

B. Use 1.5 mm (0.060 inch) thick PVB for:

3. Heat strengthened or fully tempered glass assembles.

C. Use 0.75 mm (0.030 inch) thick PVB for vertical glazing where 1.5 mm (0.060 inch) PVB is not otherwise indicated or required.

2.4 LAMINATED GLAZING ASSEMBLIES (if/as allowed and applicable)

A. See Paragraph 2.1 A above. The following are general examples:

B. Clear Glazing:

1. Both panes clear glass ASTM C1036, Type I, Class 1, Quality q3.
2. Thickness: Each pane, 3 mm (1/8 inch) thick.

C. Clear Tempered Glazing:

1. Both panes ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness: Each pane 4.8 mm (3/16 inch) thick.

D. Clear Heat-Strengthened Glazing:

1. Both panes, ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Thickness: Each pane, 3 mm (1/8 inch) thick.

2.5 GLAZING ACCESSORIES (as applicable to this Project, confirm and coordinate Door Manufacturer, Door Installer, and Glazing Supplier)

A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.

B. Setting Blocks: ASTM C864:

1. Channel shape; having 6 mm (1/4 inch) internal depth.
2. Shore a hardness of 80 to 90 Durometer.
3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.

4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:
1. Channel shape having a 6 mm (1/4 inch) internal depth.
2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
3. Lengths: One to 25 to 76 mm (one to three inches).
4. Shore a hardness of 40 to 50 Durometer.

D. Sealing Tapes:
1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, humidity, and aging.

E. Glazing Gaskets: ASTM C864:
1. Firm dense wedge shape for locking in sash.
2. Soft, closed cell with locking key for sash key.
3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

F. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as required.

G. Glazing Sealants: ASTM C920, silicone neutral cure:
1. Type S.
2. Class 25
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.

H. Color:
1. Color of glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color. Verify all colored items beforehand with Resident Engineer (formally through Submittal or as otherwise approved).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer's approved shop drawings.

B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.

B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

D. Verify that components used are compatible.

E. Clean and dry glazing surfaces.

F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL (as applicable)

A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.

B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

C. Set glazing without bending, twisting, or forcing of units.

D. Do not allow glass to rest on or contact any framing member.

E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed (to minimize wave pattern effect).

G. Laminated Glass:

1. Tape edges to seal interlayer and protect from glazing sealants.
2. Do not use putty or glazing compounds.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape or spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Trim protruding tape edge.

3.5 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.

B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.

C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.6 PROTECTION

A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.7 GLAZING SCHEDULE (General Guide)

A. Tempered Glass:

1. Install in full and half glazed doors unless indicated otherwise.

B. Laminated Glass: Install in doors, as specified, only if allowed (see Paragraph 2.1 above).

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SECTION 09 06 00
SCHEDULE FOR FINISHES

PART I - GENERAL

1.1 DESCRIPTION

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

1.2 MANUFACTURERS

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

1.3 SUBMITALS

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

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.

B. MASTER PAINTING INSTITUTE: (MPI)

2001.....Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1 COLOR SLIDES (not required unless directed otherwise by Resident Engineer)

2.2 DIVISION 31 - EARTHWORK (Not Applicable to this Project)

2.3 DIVISION 03 - CONCRETE (Not Applicable to this Project)

2.4 DIVISON 04 - MASONRY (Not Applicable to this Project)

2.5 DIVISION 05 - METALS (Not Applicable to this Project)

2.6 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES (Not Applicable to this Project)

2.7 DIVISION 07 - THERMAL AND MOISTURE PROTECTION (Not Applicable to this Project)

2.8 DIVISION 08 - OPENINGS

A. SECTION 08 11 13, HOLLOW METAL DOORS AND FRAMES

Paint both sides of door and entire frame the same color (do not paint pre-finished metal louvers, hardware, signage, and other such items attached to the door unless so directed by VAMC's Project Manager or Architect).

Component:	Color of Paint Type and Gloss:
Door (incl. integral frame for window/lite, unless frame is pre-finished).	See entry below for "SECTION 09 91 00, PAINT AND COATINGS" -- Paint Code "P-2". Doors and Frames to match, unless directed otherwise by VAMC's Proj. Man.
Frame	Same as "Door" above.

B. SECTION 08 71 00, BUILDERS HARDWARE

Item	Material	Finish—verify all with VAMC
New Hinges	See Spec. (verify by Submittal)	Match Finish of Exist. Hinges
New Door Closer/s	See Spec. (verify by Submittal)	US10 or equiv.
Overhead Door Stop	See Spec. (verify by Submittal)	US10
New Floor/Wall Stops/Holders	See Spec. (verify by Submittal)	US10
Locks/Latches	See Spec. (verify by Submittal)	US10 (if available) US26D (where US10 not available)
Kick Plates	Metal	US10
Exit Device (vertical-rod)	See Spec. (verify by Submittal)	US10 (if available) US26D (if US10 not available)

2.9 DIVISION 09 - FINISHES

A. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
N/A	Exposed Suspension System	White	Submit for Approval	Verify by Submittal
N/A	Type III	White	Armstrong	Cortega 769

B. RESILIENT TILE FLOORING (not specified in Technical Specifications)

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
N/A	Verify on site	VCT	Verify	To match existing

C. SECTION 09 65 16, RESILIENT SHEET FLOORING, HEAT WELDED SEAMS (WSF) - Including integral coved base.

Finish Code	Pattern name	Manufacturer	Mfg. Color Name/No.
N/A	Marmoleum Real ("Topshield" Finish)	Forbo Industries, Inc.	TBD

1. SECTION 09 65 16, WELDING ROD (WSF)

Finish code	Manufacturer	Mfg. Color Name/No.
N/A	Forbo Industries, Inc.	TBD (see Spec.)

2. SECTION 09 65 16, CAP STRIP (WSF)

Finish Code	Manufacturer	Mfg. Color Name/No.
N/A	Submit for Approval	Metallic (see spec.)

D. RESILIENT BASE (not specified in Technical Specifications)

Finish Code	Item	Height	Manufacturer	Mfg Name/No.
N/A	RB	Verify on site	Verify	To match existing

E. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

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

"TBD" = To Be Determined

2. Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1	LE, MPI 54, Level 5, Semi-Gloss	Columbia 05-572	"Picket White" / CW066W
P-2 (2 options)	AE, MPI 11, Level 5, Semi-Gloss **OR** AE, MPI 119, Level 6, Gloss	Columbia 05-502 **OR** Columbia 05-260	TBD
P-3	See Appendix at end of Painting Section 09 10 00 (match existing)	TBD	TBD (match existing)

2.10 DIVISION 10 - SPECIALTIES

A. SECTION 10 26 00, WALL AND DOOR PROTECTION (Handrail/Wall-Guard, Corner Guard, Wainscot)

Item	Material	Manufacturer	Mfg. Color Name/No.
Handrail/Wall-Guard	Vinyl/Alum (verify)	Verify	To match existing
Corner Guard	Stainless Steel	Submit for Approval	NF
High-Impact Wall Covering (Wainscot)	FRP	Submit for Approval	Textured, White (non-toned white)

2.12 DIVISION 12- FURNISHINGS

A. SECTION 12 36 00, COUNTERTOPS AND ACCESSORIES

Type	Finish/Color
Plastic Laminate	TBD

2.15 DIVISION 15 - PLUMBING (See Mechanical, Division-15 Specifications)

A. SECTION 15410, PLUMBING FIXTURES AND TRIM

Item	Color
Water Closet	White
Lavatories	White
Service Sink	Existing (white)

2.16 DIVISON 16 - ELECTRICAL (See Electrical, Division-16 Specifications)

PART III EXECUTION

3.1 FINISH SCHEDULES & MISCELLANEOUS ABBREVIATIONS

A. **Contractor/Subcontractors/Subbidders Note**: Contact the Resident Engineer or the Architect for clarification if abbreviations are encountered in this Section that conflict with abbreviations in other Technical-Specification Sections or the Drawings (or if such instances are found within the Drawings and/or Specifications), or if duplicate abbreviations for different materials are found in

the Construction Documents. Additional Abbreviations are found throughout the Drawings (contact Architect or Project Engineers regarding questions as to the intended meaning of abbreviations).

FINISH SCHEDULE & MISCELLANEOUS ABBREVIATIONS	
Term	Abbreviation
Acoustical Ceiling	AT or SUSP. CEIL.
Carpet	CP
Concrete	C or CONC.
Concrete Masonry Unit	CMU
Existing	E, (E), or EXIST.
Exposed	EXP
Exterior	EXT
Exterior	EXT
Feature Strips	FS
Fiberglass-Reinforced Plastic (Rstrm Wainscot)	FRP
Gypsum Wallboard	GWB
Material	MAT
Natural Finish	NF
Not Applicable	N/A
Paint	P
Plastic Laminate	HPDL or P.L.
Resilient Base (match exist--verify if rubber or vinyl)	RB
Resilient Sheet Flooring (Welded Seams)	WSF
Vinyl Composition Tile	VCT
To Be Determined	TBD
Wood	WD

3.2 FINISH-SCHEDULE SYMBOLS

Symbol Definition:
** Same finish as adjoining walls
- No color required
E Existing
XX To match existing
EFTR Existing finish to remain
RM Remove

3.3 ROOM FINISH SCHEDULE (see next page)

A. Match adjoining or existing similar surfaces colors, textures or patterns where disturbed or damaged by alterations or new work when not scheduled.

B. ROOM FINISH SCHEDULE

Room No. and Name		FLOOR			BASE		WALL		WAINSCOT		CEILING		REMARKS
		MAT	FC		MAT	FCC N/A	MAT	FCC N/A	MAT	FC N/A	MAT	FCC N/A	
137 Unisex Restroom	Remodel	WSF	N/A	N	WSF		P-1		FRP		AT All rooms. See Drawing D/A-1 Refl. Ceil. Plan for specific locations for new and existing AT. Replace existing panels with new where exist'g are damaged (if replaced, then paint new and existing panels to match, per 09 91 00 paint spec, as directed by VAMC or Architect).		
				E	WSF		P-1		FRP				
				S	WSF		P-1		FRP*				*Where shown on Drawings
				W	WSF		P-1		FRP				
138-1 Mech. Closet	Remodel	VCT E XX	N/A	N	RB, XX		P-1						
				E	RB, XX		P-1						
				S	RB, XX		P-1						
				W	RB, XX		P-1						
138-2 Soiled Utility	Remodel	WSF	N/A	N	WSF		P-1		FRP				
				E	WSF		P-1		FRP				
				S	WSF		P-1		FRP				
				W	WSF		P-1		FRP				
C1-6 Corridor	Remodel	CP E	N/A	N*	RB, XX		P-3**						*Verify if/where "N" & "S" are applicable (unlikely)
				E	RB, XX		P-3**						
				S*	RB, XX		P-3**						
				W	RB, XX		P-3**						

--- E N D---

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel-stud wall systems, wall furring, fasteners, and accessories for the screw attachment of gypsum board. Work associated with Acoustical Ceilings is also specified for convenience, should such Work be incorporated or coordinated into the Project.

1.2 RELATED WORK

A. Section 09 29 00, GYPSUM BOARD.

B. Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 TERMINOLOGY

A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.

B. Underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.

C. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

A. As applicable and as requested, submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Studs, runners and accessories.
2. Hanger inserts.
3. Channels (Rolled steel).
4. Furring channels.
5. Screws, clips and other fasteners.

C. Shop Drawings:

1. Typical metal stud and furring construction system including details around openings and corner details.
2. Column fire-rated protection, if metal studs are employed.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society For Testing And Materials (ASTM)

A123-02.....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

A641-03.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-07.....Terminology Relating to Gypsum and Related Building Materials and Systems

C635-04.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636-06.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-07.....Non-Structural Steel Framing Members

C754-04.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03.....Installation of Interior Lathing and Furring

C954-04.....Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

C1002-04.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E580-06.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

2.2 STEEL STUDS AND RUNNERS (TRACK)

A. ASTM C645, modified for thickness specified and sizes and shown.
   1. Use ASTM A525 steel, 0.9 mm (0.0359-inch) thick bare metal (20 gauge).
   2. Runners same thickness as studs.

B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.

C. Doubled studs for openings and studs for supporting concrete backer-board.

D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

2.3 FURRING CHANNELS, if any (incidental or by addendum/Change-Order)

A. Rigid furring channels (hat shape): ASTM C645.

B. Resilient furring channels:

1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.

C. "Z" Furring Channels (for insulation):

1. Not less than 0.45 mm (0.0179-inch)-thick bare metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
2. Web furring depth to suit thickness of insulation with slotted perforations.

D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

A. ASTM C754, except as otherwise specified.

B. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.

C. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.

D. Tie Wire and Hanger Wire:

1. ASTM A641, soft temper, Class 1 coating.
2. Gage (diameter) as specified in ASTM C754 or ASTM C841.

E. Attachments for Wall Furring, if any: Standard (verify).

1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.

F. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION CRITERIA

A. Where fire-rated construction is required (for column, and elsewhere if needed), the construction shall be exactly the same as that used in the fire-rating test.

B. Construction requirements for fire-rated assemblies and materials shall be as shown or specified; the provisions of the scope paragraphs of ASTM C754 and ASTM C841 regarding details of construction shall not apply.

3.2 INSTALLING STUDS

A. Install studs in accordance with ASTM C754, except as otherwise shown, specified, or approved.

B. Space studs not more than 400 mm (16 inches) on center.

C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.

D. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead (see Drawing E/A1):

1. Construct bracing of minimum 89 mm (3-1/2 inch) studs with ends bent to form surfaces for anchorage to top of wall and over head construction. If lapped, then lap studs not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to structure overhead; secure to structure overhead with two fasteners and to runner/track with two fasteners.

E. Openings:

1. Coordinate framing preparation at door openings for maximum doorframe support and ease of doorframe attachment (number/type/orientation of metal studs, alternate wrap-around 2x wood framing, and so on). Consider the following alternate methods, along with other accepted standard practices for like circumstances and doors:
   a. Frame jambs of openings in stud partitions and furring with two studs placed back-to-back or as otherwise shown or required for specific condition.
   b. Wrap door-frame-supported edges of openings with 2x wood framing.
2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.

F. Fastening Studs:

1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.

2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.

B. Wall Furring-Stud System or Furring-Bracket System:

1. Framed with 3-1/2 inch studs where shown, 400 mm (16 inches) on center.
2. Brace as specified in ASTM C754 for Wall Furring-Stud System on side without finish, allowing for necessary vertical plumbing pipes (coordinate with Plumbing Subcontractor).
3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

A. Provide for attachment and support of electrical outlets, plumbing, mechanical fixtures, access panel frames, wall bumpers, handrail brackets, and other items like door buttons (proximity readers) supported by stud construction.

B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

C. Installing Ceiling Bracing System (if required):

1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and over head construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580.

3.5 TOLERANCES

A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.

B. Plumb and align vertical members within 3 mm (1/8-inch.)

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies installation and finishing of gypsum board, including incidental Work such as acoustical batt insulation for sound attenuation.

1.2 RELATED WORK

A. Installation of steel framing members for walls, partitions, furring, and misc. ceiling support: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Section 09 91 00, PAINTING.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. Underside of Structure Overhead shall be the underside of the floor or roof construction supported by the trusses joists.

C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

D. "GWB" in Project Specifications and Drawings refers to "Gypsum Wallboard" or "Gypsum Board", all three terms being interchangeable for the purposes of this Project.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, if/as requested by the VAMC's Project Manager.

B. Manufacturer's Literature and Data:
   1. Cornerbead and edge trim.
   2. Finishing materials.
   3. Laminating adhesive.
   4. Gypsum board, each type.

C. Shop Drawings:
   1. Typical gypsum board installation, showing corner details, edge trim details and the like.
   2. Typical fire-rated column fireproofing, indicating detailing of construction the same as that used in fire rating test.

D. Samples:
   1. Cornerbead.
   2. Edge trim.
   3. Control joints.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing And Materials (ASTM):

C11-07.....Terminology Relating to Gypsum and Related Building Materials and Systems

C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board

C840-07.....Application and Finishing of Gypsum Board

C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness

C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base

C1396-06.....Gypsum Board

E84-07.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Inchcape Testing Services (ITS):

Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD (regarding recycling requirements below, contact VAMC's Project Manager if Contractor has questions as to applicability)

A. Gypsum Board: ASTM C1396, Type X, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.

B. Gypsum cores shall contain a minimum of 95 percent post industrial recycled gypsum content. Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 ACOUSTICAL BATT INSULATION FOR SOUND ATTENUATION

A. Mineral-Fiber Batt-Blanket Insulation: ASTM C 665 with fibers manufactured from glass, with flame-spread index of 25 or less. Provide Ceiling and Wall/Partition Sound-Attenuation Insulation as follows.

B. Wall and Ceiling Insulation for Sound Attenuation (see Building Section E/A1 and relate to Floor Plan and Reflected Ceiling Plan): ASTM C665, Type I, unfaced, friction-fit type (for wall application), with an installed thermal resistance of R-13 (R-11 OK if R13 not readily available). Note: Do not install vapor barrier with this insulation.

2.3 ACCESSORIES

A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.4 FASTENERS

A. ASTM C1002 and ASTM C840, except as otherwise specified.

B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).

C. Select screws of size and type recommended by the manufacturer of the material being fastened.

D. For fire rated construction, type and size same as used in fire rating test.

E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

A. Extend all layers of gypsum board from floor to underside of structure overhead on following partitions and furring:

1. Two sides of partitions: On existing walls/partitions that originally extended to the underside of structure overhead, of which gypsum board was removed during demolition (i.e. replace all such GWB).
2. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead.

B. In locations other than those specified, extend gypsum board from floor to heights as follows:

1. Not less than 100 mm (4 inches) above suspended acoustical ceilings (above high-side susp. Acous. ceil., where unequal ceiling height at each side of wall).
2. At existing ceilings only where approved by VAMC's Project Manager.

3.2 INSTALLING GYPSUM BOARD

A. Coordinate installation of gypsum board with other trades and related work.

B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.

C. Use gypsum boards in maximum practical lengths to minimize number of end joints.

D. Bring gypsum board into contact, but do not force into place.

E. Walls:

1. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints (gypsum board shall be applied vertically over "Z" furring channels, if any by Addendum or Change Order).
5. For multi-layered fire-rated column-assembly fireproofing, implement detailing of construction exactly the same as that used in fire rating test. Verify after demolition (see detail 1/A1)

F. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
   a. Install at all vertical and horizontal external corners and where otherwise may be shown, indicated, or directed by VAMC's Project Manager.
   b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
   a. At both sides of expansion and control joints, if any, unless shown otherwise.

b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.

c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.

d. Where shown, indicated, or directed by VAMC's Project Manager.

3.3 FINISHING OF GYPSUM BOARD

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level-5 finish for all finished areas open to public view.

B. Before proceeding with installation of finishing materials, assure the following:

1. Gypsum board is fastened and held close to framing or furring.
2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of non-decorated gypsum-board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the construction. Sanding is not required of non decorated surfaces.

3.4 REPAIRS

A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.

B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surfaces.

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SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1- GENERAL

1.1 DESCRIPTION

A. Metal ceiling suspension system for acoustical ceilings.

B. Acoustical units.

1.2 RELATED WORK

A. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Acoustical units, each type, with label indicating conformance to specification requirements, including units specified to match existing.

C. Manufacturer's Literature and Data:

1. Ceiling suspension system, each type, showing complete details of installation, including suspension system specified to match existing.
2. Acoustical units, each type

D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

1.4 DEFINITIONS

A. Standard definitions as defined in ASTM C634.

B. Terminology as defined in ASTM E1264.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

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

A641/A641M-03.....Zinc-coated (Galvanized) Carbon Steel Wire

A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

C423-07.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C634-02 (E2007).....Standard Terminology Relating to Environmental Acoustics

C635-04.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

C636-06.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

E84-07.....Surface Burning Characteristics of Building Materials

E119-07.....Fire Tests of Building Construction and Materials

E413-04.....Classification for Rating Sound Insulation.

E580-06.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint

E1264-(R2005).....Classification for Acoustical Ceiling Products

PART 2- PRODUCTS

2.1 METAL SUSPENSION SYSTEM

A. ASTM C635, heavy-duty system, except as otherwise specified.
   1. Ceiling suspension system members may be fabricated from either of the following unless specified otherwise.
      a. Galvanized cold-rolled steel, bonderized.
      b. Extruded aluminum.
      c. Fire resistant plastic (glass fiber) having a flame spread and smoke developed rating of not more than 25 when tested in accordance with ASTM E84.
   2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.

B. Exposed grid suspension system for support of lay-in panels:
   1. Exposed grid width not less than 22 mm (7/8 inch) with not less than 8 mm (5/16 inch) panel bearing surface.
   2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members.
   3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

2.2 PERIMETER SEAL

A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.

B. Thickness as required to fill voids between back of wall molding and finish wall.

C. Not less than 9 mm (3/8 inch) wide strip.

2.3 WIRE

A. ASTM A641.

B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).

C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.4 ANCHORS AND INSERTS (as applicable to this Project)

A. Use anchors or inserts to support twice the loads imposed by hangers attached thereto.

B. Hanger Inserts:

1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
2. Nailing type option for wood forms:
   a. Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
   b. Lower portion provided with not less than 8 mm (5/16 inch) hole to permit attachment of hangers.

C. Clips:

1. Galvanized steel.
2. Designed to clamp to steel beam or bar joists, or secure framing member together.
3. Designed to rigidly secure framing members together.
4. Designed to sustain twice the loads imposed by hangers or items supported.

D. Tile Splines (if applicable): ASTM C635.

2.5 CARRYING CHANNELS FOR SECONDARY FRAMING, if any

A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.

B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

2.6 ACOUSTICAL UNITS (PANELS)

A. General:

1. ASTM E1264, weighing 3.6 kg/m^2 (3/4 psf) minimum for mineral fiber panels.
2. Class A Flame Spread: ASTM 84

3. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
4. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.
5. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces, except as specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
6. Lay-in panels: Sizes as shown, with square edges--nominal 24"x48" (610 by 1220mm).

B. Type III Units - Mineral base with water-based painted finish less than 10 g/l VOC, Form 2 - Water felted, minimum 16 mm (5/8 inch) thick. Mineral base to contain minimum 65 percent recycled content.

2.7 ACOUSTICAL BATT INSULATION FOR SOUND ATTENUATION

A. Mineral-Fiber Batt-Blanket Insulation: ASTM C 665 with fibers manufactured from glass, with flame-spread index of 25 or less. Provide Ceiling and Wall/Partition Sound-Attenuation Insulation as follows.

B. Wall and Ceiling Insulation for Sound Attenuation (see Building Section E/A1 and relate to Floor Plan and Reflected Ceiling Plan): ASTM C665, Type I, unfaced, friction-fit type (for wall application), with an installed thermal resistance of R-13 (R-11 OK if R13 not readily available). Note: Do not install vapor barrier with this insulation.

2.8 ACCESS IDENTIFICATION

A. Markers:
1. Use colored markers with pressure sensitive adhesive on one side.
2. Make colored markers of paper of plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.
3. Use markers of the same diameter throughout building.

B. Color Code: Use following color markers for service identification:

Color.....Service
Red.....Sprinkler System: Valves and Controls
Green.....Domestic Water: Valves and Controls
Yellow.....Chilled Water and Heating Water
Orange.....Ductwork: Fire Dampers
Blue.....Ductwork: Dampers and Controls
Black.....Gas: Laboratory, Medical, Air and Vacuum

PART 3 EXECUTION

3.1 CEILING TREATMENT, as applicable to this Project

A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at

changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.

B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.

C. Moldings:
   1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
   2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.

D. Perimeter Seal:
   1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
   2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

E. Existing ceiling:
   1. Where extension of existing ceilings occur, match existing.
   2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
   3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

A. General:
   1. Install metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636, except as specified otherwise.
   2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
   3. Support a maximum area of 1.48 m^2 (16 sf) of ceiling per hanger.
   4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
   5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
   6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
   7. Use main runners not less than 1200 mm (48 inches) in length.

8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:

1. Steel:

a. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.

(1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.

(2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.

b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.

c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

C. Direct Hung Suspension System:

1. As illustrated in ASTM C635.
2. Support main runners by hanger wires attached directly to the structure overhead.
3. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

D. Indirect Hung Suspension System:

1. As illustrated in ASTM C635.
2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) or center so as to insure that specified requirements are not exceeded.
3. Support main runners by specially designed clips attached to carrying channels.

E. Seismic Ceiling Bracing System:

1. Construct system is accordance with ASTM E580.

2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

3.3 ACOUSTICAL UNIT INSTALLATION

A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.

1. Install tile to lay level and in full contact with exposed grid.
2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.

3.4 Acoustical Batt Insulation for Sound Attenuation:

A. Carefully lay in batts to cover as much of the ceiling panels as is practical, except do not install batt insulation over light fixtures, paying particular attention to covering the perimeter two feet continuously and completely.

3.5 Markers (Access Identification):

A. Verify with Resident Engineer, Maintenance Staff, and Mechanical Subcontractor the extent of the following Work required.

B. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.

C. Attach colored markers to exposed grid on opposite sides of the units providing access.

3.6 CLEAN-UP AND COMPLETION

A. Replace damaged, discolored, dirty, cracked and broken acoustical units.

B. Leave finished work free from defects.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies the installation of sheet flooring with backing and integral cove base. Sheet-flooring type/installation shall include:
   1. Heat-welded seams in all areas.
   2. Integral cove base in all areas, except where noted otherwise in Section 09 06 00 (no cove base in Mechanical Closet):
      a.) Vertical, integral, six-inch-high cove base of sheet flooring at intersection of floor and vertical surfaces (continuous from horizontal floor to/including vertical 6" base).

B. This Section also includes furnishing and installing the underlayment (a thin, high-grade, plywood layer between the plywood subfloor and the sheet flooring).

1.2 RELATED WORK

A. Color, pattern and texture: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY CONTROL-QUALIFICATIONS:

A. The VAMC's Project Manager shall approve products or service of proposed manufacturer, suppliers, and installers, and the Contractor shall submit certification that:
   1. Heat welded seaming is manufacturer's prescribed method of installation.
   2. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.
   3. Manufacturer's product submitted has been in satisfactory operation, on three installations similar and equivalent in size to this project for three years. Submit list of installations.

B. The resilient floor covering shall meet fire performance characteristics as determined by testing products, per ASTM test method, indicated below by Underwriters Laboratories, Inc. (UL) or another recognized testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
   2. Smoke Density: Less than 450 per ASTM E662.

C. The floor covering manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

1.4 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit following:

B. Manufacturer's Literature and Data:

1. Description of resilient material and accessories to be provided.
2. Resilient material manufacturer's recommendations for adhesives, weld rods, sealants, and underlayment.
3. Application and installation instructions.

C. Samples:

1. Sheet material, 300 mm by 300 mm (12 inch by 12 inch), of selected color/pattern (Submit welding rod, if requested).
2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.
3. Proposed Edge Strip.

D. Shop Drawings: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.

E. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.

1.5 PROJECT CONDITIONS

A. Maintain temperature of floor materials and room, where work occurs, above 18 ° C (65 °F) and below 38 °C (100 °F) for 48 hours before, during and for 48 hours after installation. After above period, room temperature shall not fall below 13 °C (55 °F).

B. Construction in or near areas to receive flooring work shall be complete and dry. Follow flooring manufacturer's recommendations for bond and moisture testing, as applicable to this Project.

C. Schedule construction so that floor receives no construction traffic when completed.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.

B. Deliver sheet flooring full width roll, completely enclosed in factory wrap, clearly marked with the manufacturer's number, type and color, production run number and manufacture date.

C. Store materials in weathertight and dry storage facility. Protect from damage due to handling, weather, and construction operations before, during and after installation. Store sheet flooring on end with ambient temperatures maintained as recommended by manufacturer.

D. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society For Testing Materials (ASTM):

E648-06.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Energy Source.

E662-06.....Specific Optical Density of Smoke Generated by Solid Materials.

F710-05.....Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

F1303-04.....Sheet Vinyl Floor Covering with Backing.

C. Resilient Floor Covering Institute (RFCI):

Recommended Work Practices for Removal of Resilient Floor Coverings.

1.8 SCHEDULING

A. Interior finish work such as drywall finishing, ceiling work, and painting work shall be complete and dry before installation. Mechanical, electrical, and other work above ceiling line shall be completed. Heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.9 WARRANTY:

A. Submit written warranty, in accordance with FAR clause 52.246-21, Warranty of Construction requirements except that warranty period shall be extended to include two (2) years.

PART 2 - PRODUCTS

2.3 UNDERLAYMENT (Furnished under this Specification Section 09 65 16)

A. APA B-C Underlayment Exterior plywood panels with fully sanded face, unless otherwise required and approved. 1/4"- or 3/8"- thick per manufacturer's recommendations and requirements for meeting warranty requirements.

2.4 SHEET FLOORING

A. ASTM F2034 (Fed Spec. L-F-475A).

1. Those offering approved products in compliance with Specification Section 09 65 16 include:

a. *Forbo Industries, Inc.* (manufacturer), "Marmoleum" (with "Topshield" finish).

b. *Armstrong World Industries* (manufacturer), "Marmorette Linoleum Flooring".

B. Minimum nominal thickness 2 mm (0.08 inch); 1800 mm (6 ft) minimum width.

C. Critical Radiant Flux: 0.45 watts per sq.cm or more, Class I, per ASTM E648.

D. Smoke density: less than 450 per ASTM E662.

E. Color and pattern of sheet flooring of the same production run.

F. Heat-Welding Rod as manufactured and/or supplied by sheet-flooring manufacturer. Welding-rod Color to be selected by Owner from manufacturer's recommended color-matched rod for the selected color/pattern of flooring. Note: Use manufacturer's color recommendation on rod if only one color is recommended (i.e. Owner selection of welding-rod color is not required if sheet-flooring manufacturer has only one such recommendation).

2.5 ADHESIVES

A. Water resistant type recommended by the sheet flooring manufacturer for the conditions of use.

1. Use only sheet-flooring manufacturer's adhesive or exact adhesive as specified by sheet-flooring manufacturer.

2.6 BASE CAP STRIP AND COVE STRIP

A. Metallic cap strip, compatible with the sheet flooring. Submit for approval.

B. Fillet Strip (at cove): 19 mm (3/4 inch) radius fillet strip per manufacturer's standard, compatible with sheet material (submit for approval).

2.7 LEVELING COMPOUND

A. Per manufacturer's printed recommendation for project substrate.

2.8 PRIMER

A. If/as recommended by the adhesive or sheet-flooring manufacturer.

2.9 EDGE STRIPS

A. Rubber/vinyl flanged zero-edge reducer strip, or extruded aluminum (mill finish), or other approved, mechanically fastened edge strip. Coordinate type and style with existing adjacent carpet. Submit edge strip through normal Submittal process for approval.

B. As a guideline only, consider 28 mm (1-1/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.

C. Unless otherwise approved, drill and counter sink edge strips for flat head screws. Space holes near ends and approximately 225 mm (9 inches) on center in between. See also Part 3 below.

2.10 SEALANT (if any)

A. Install only where approved and as approved.

B. Compatible with sheet flooring.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. See Paragraph 1.5 above.

3.2 SUBFLOOR/UNDERLAYMENT INSTALLATION AND PREPARATION

A. Unless otherwise approved, preparation shall include the complete removal of existing resilient floor (vinyl composition tiles) and existing adhesive in accordance with Resilient Floor Covering Institute recommendations in manual RFCI-WP. Solvents shall not be used.

1. For bidding purposes assume that the Work of this Section 09 65 16 includes the removal of existing flooring in all areas to receive new Sheet Flooring.

B. Examine existing subfloor/underlayment after removing exiting flooring.

1. Confirm exact requirements for subsequent flooring preparation.

a.) For bidding purposes assume that new underlayment will be installed directly over existing underlayment after minor leveling of existing underlayment.

b.) If so required for leveling to match adjacent floor level, then remove existing underlayment and adjust thickness of new underlayment accordingly (at additional adjustment to Contract Amount). Thus remove existing underlayment only after approval of VAMC's Project Manager, including pre-approval of adjustment amount.

C. Install new underlayment per sheet-flooring manufacturer's requirements.

D. Broom or vacuum clean substrates to be covered by sheet floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, deleterious materials, or dust.

E. Primer (not likely needed): If recommended by flooring manufacturer, prior to application of adhesive, apply primer in accordance with manufacturer's directions.

F. Correct conditions which will impair proper installation, including pits, dents, protrusions, cracks or joints.

G. Fill cracks, joints, depressions, and other irregularities with leveling compound.

1. Do not use adhesive for filling or leveling purposes.
2. Do not use leveling compound to correct imperfections which can be corrected by spot sanding or similar means.
3. Trowel leveling compound to a smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.

H. Clean floor of oil, paint, dust and deleterious substances. Leave floor dry and cured free of residue from existing curing or cleaning agents.

3.3 INSTALLATION OF FLOORING

A. Install work in strict compliance with manufacturer's instructions and approved layout drawings.

B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams.

C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.

D. Match edges of resilient floor coverings for color shading and pattern at seams.

E. Where resilient sheet flooring abuts other flooring material floors shall finish as level as is practical (confirm degree of "level match" with VAMC's Project Manager during preparation phase -- see 3.2.B. 1. (b.) above.

F. Extend sheet vinyl floor coverings into toe spaces, door reveals, and similar openings.

G. Inform the VAMC's Project Engineer of conflicts between this Section 09 65 16 and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.

H. Install sheet in full coverage adhesives.
   1. Air pockets or loose edges will not be accepted.
   2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.

I. Keep joints to a minimum; avoid small filler pieces or strips.

J. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.

K. Follow manufacturer's recommendations regarding pattern match, if applicable.

L. Installation of Edge Strips:
   1. Locate edge strips under center lines of doors unless otherwise indicated.

2. Set aluminum strips, if aluminum approved, in a bed of adhesive/mastic, and anchor edge strip to subfloor (through underlayment) with screws.

3.4 INSTALLATION OF INTEGRAL COVED BASE

A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 150 mm (6 inches) high.

B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners. Approval or method (with or without trim) required beforehand.

3.5 SEAM WELDING

A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.

B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.

C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.

D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3.6 CLEANING

A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.

B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.

C. Clean and polish materials per flooring manufacturer's written recommendations.

D. Vacuum floor thoroughly.

E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer's recommendations.

F. Upon completion, VAMC's Project Manager shall inspect floor and base.

G. Perform initial maintenance according to flooring manufacturer's written recommendations.

3.7 PROTECTION:

A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.

B. Keep traffic off sheet flooring for 24 hours after installation.

C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the Resident Engineer.

D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean and re-prepare sheet flooring in accordance with manufacturer's recommendations.

- - - E N D - - -

SECTION 09 91 00
PAINTING

PART 1-GENERAL

1.1 DESCRIPTION

A. Section 09 91 00 PAINTING specifies field painting (and is applicable to Shop Painting pf base and finish coats).

B. Section 09 91 00 PAINTING specifies and otherwise addresses prime coats which may be applied in shop under other sections.

1.2 RELATED WORK

A. Shop prime painting of steel and ferrous metals: Division 08 - OPENINGS, Division 10 - SPECIALTIES, Division 15 - MECHANICAL (PLUMBING and HEATING, VENTILATION AND AIR-CONDITIONING), Division 16 - ELECTRICAL, Division 28 - ELECTRONIC SAFETY AND SECURITY sections.

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

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:
Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

C. Sample Panels (if/as requested by VAMC's Project Manager):
1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
2. Panels to show color: Composition board, 100 by 250 by 3 mm (4 inch by 10 inch by 1/8 inch).
3. Attach labels to panel stating the following:
   a. Federal Specification Number or manufacturers name and product number of paints used.
   b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
   c. Product type and color.

d. Name of project.

4. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.

D. Sample of identity markers if used.

E. Manufacturers' Certificates indicating compliance with specified requirements:

1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.

1.4 DELIVERY AND STORAGE

A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
2. Product type.
3. Batch number.
4. Instructions for use.
5. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:

1. Federal Specification Number, where applicable, and name of material.
2. Surface upon which material is to be applied.
3. If paint or other coating, state coat types; prime, body or finish.

C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

B. American Conference of Governmental Industrial Hygienists (ACGIH):

ACGIH TLV-BKLT-1992.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)

ACGIH TLV-DOC.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Sixth Edition)

C. American National Standards Institute (ANSI):

A13.1-96.....Scheme for the Identification of Piping Systems

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

D260-86.....Boiled Linseed Oil

E. Commercial Item Description (CID):

F. Master Painters Institute (MPI), if/as applicable:
No. 11-06..... Exterior Latex, Semi-Gloss (AE)
No. 18-06..... Organic Zinc Rich Primer
No. 43-06..... Interior Satin Latex, MPI Gloss Level 4
No. 44-06..... Interior Low Sheen Latex, MPI Gloss Level 2
No. 50-06..... Interior Latex Primer Sealer
No. 52-06..... Interior Latex, MPI Gloss Level 3 (LE)
No. 53-06..... Interior Latex, Flat, MPI Gloss Level 1 (LE)
No. 54-06..... Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)
No. 67-06..... Int. Latex Fire Retardant, Top-Coat (ULC Approved) (FR)
No. 95-06..... Fast Drying Metal Primer
No. 119-06.....Exterior Latex, High Gloss (acrylic) (AE)
No. 141-06..... Interior High Performance Latex (SG) MPI Gloss Level 5

PART 2 - PRODUCTS

2.1 MATERIALS: **Also see "Appendix" at end of this Section 09 91 00.**

A. Exterior Latex, Semi-Gloss (AE): MPI 11 - **Hollow-Metal Option.**
B. Interior Satin Latex: MPI 43 - if/as verified for matching existing Corridor Wall paint (and approved by VAMC's Project Manager).
C. Interior Low Sheen Latex: MPI 44 - if/as verified for matching existing Corridor Wall paint (and approved by VAMC's Project Manager).
D. Interior Latex Primer Sealer: MPI 50 - verify compatability.
E. Interior Latex, MPI Gloss Level 3 (LE): MPI 52 - if/as verified for matching existing Corridor Wall paint (and approved by VAMC's Project Manager).
F. Interior Latex, Flat, MPI Gloss Level 1 (LE): MPI 53 - if/as verified for matching existing Corridor Wall paint (and approved by VAMC's Project Manager).
G. Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE): MPI 54 – **New and Repainted "Isolated" Non-Corridor Walls.**
H. Interior Latex Fire Retardant, Top-Coat (ULC Approved) (FR): MPI 67 - See 3.6 D. 2. c. below re. ceiling panels (likely will not be used).
I. Exterior Latex, High Gloss (acrylic) (AE): MPI 119 - **Hollow-Metal Option.**
J. Interior High Performance Latex (SG), MPI Gloss Level 5: MPI 141 - Hollow-Metal only if approved by VAMC's Project Manager (do not use MPI 141 without specific approval).

2.2 PAINT PROPERTIES

A. Use ready-mixed (including colors).
B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE

A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.

1. Volatile Organic Compounds (VOC): VOC content of paint materials shall not exceed 10g/l for interior latex paints/primers and 50g/l for exterior latex paints and primers.
2. Asbestos: Materials shall not contain asbestos.
3. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
4. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
5. Use high performance acrylic paints in place of alkyd paints, where possible.
6. VOC content for solvent-based paints shall not exceed 250g/l and shall not be formulated with more than one percent aromatic hydro carbons by weight.

PART 3 - EXECUTION

3.1 JOB CONDITIONS (<u>including off-site Job Conditions</u>)

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each days work.

B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
   a. Less than 3 degrees C (5 degrees F) above dew point.
   b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
2. Maintain interior temperatures until paint dries hard.
3. Do no exterior painting when it is windy and dusty.
4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
5. Apply only on clean, dry and frost free surfaces except as follows:
   a. Apply water-thinned acrylic paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.

3.2 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays, and providing that method surface preparation is satisfactorily addressed in paint manufacturer's printed instructions and recommendations, and is not contrary to such instructions and recommendations.

B. General:

1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
2. Remove items for reinstallation, and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
3. See other sections of specifications for specified surface conditions and prime coat.
4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used.

C. Wood (if any): Follow manufacturer's instructions.

D. Ferrous Metals:

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

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

3.3 PAINT PREPARATION

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

3.4 APPLICATION

A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
C. Apply each coat evenly and cover substrate completely.
D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
F. Apply by brush, roller or spray, except as otherwise specified (see G. below).
G. Do not spray paint in existing occupied spaces unless approved by VAMC's Project Manager, except in spaces sealed from existing occupied spaces.
   1. In areas, where paint is allowed to be applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT

PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.

H. Do not paint in closed position operable items such as access doors and panels, and similar items.

3.5 PRIME PAINTING

A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required.

D. Prime rebates for stop glazing of steel.

E. Metals:

1. Doors and Doorframes: Shop Prime with manufacturer's standard product. If re-priming (or spot priming) becomes necessary, first contact Paint Supplier regarding recommended primer, and then contact Door Supplier to confirm compatibility of recommended re-primer with original primer.

F. Gypsum Board:

1. Primer: MPI 50(Interior Latex Primer Sealer).

3.6 INTERIOR FINISHES

A. Apply following finish coats over prime coats in spaces and on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation.
3. Ferrous Metal (Hollow-Metal Doors/Frames and any other ferrous metal):
   a. Apply two coats of Acrylic Emulsion (AE): MPI 11 - semi-gloss (Gloss Level 5); or MPI 119 - gloss (Gloss Level 6).
   b. In lieu of a. above, VAMC's Project Manager may consider two coats of High-Performance Latex (SG) MPI 141 - semi-gloss (Level 5), however specific formal approval of this finish is required.

C. Gypsum Board:

1. On "isolated" non-corridor walls apply one coat of MPI 50(Interior Latex Primer Sealer plus two coats of MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)).
2. On corridor walls apply one coat of MPI 50(Interior Latex Primer Sealer plus two coats of MPI 43/44/52/53/54 (Interior Latex, various types, MPI Gloss Levels 1-5 to match existing adjacent paint) as verified.

D. Miscellaneous, if any:
   1. Apply if/where specified in Section 09 06 00, SCHEDULE FOR FINISHES and other finishes that are within area of construction, whether scheduled or not. Verify paint type with VAMC's Project Manager.
   2. Existing acoustical panels scheduled, or otherwise arranged, to be repainted:
      a. Clean units free of dust, dirt, grease, and other deterrents to paint adhesion.
      b. Mineral fiber units: One coat of MPI 53 (Interior Latex, Flat, MPI Gloss Level 1 (LE)).
      c. Units of organic fiber or other material not having a class A rating: MPI 67 (Interior-Latex Fire Retardant, Top-Coat (ULC Approved) (FR)) fire-retardant paint. Verify requirements and paint type, with approval by VAMC's Project Manager.

3.7 REFINISHING EXISTING PAINTED SURFACES

A. Remove (for subsequent reinstall) items as specified under surface preparation.
B. Clean, patch and repair existing surfaces as specified under surface preparation.
C. Remove existing finishes or apply separation coats to prevent non-compatible coatings from having contact.
D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
E. Sand existing pre-paint coatings to a feather edge so that transition between new and existing finish will not show in finished work.
F. Determine need for primer ("no primer" requires prior approval from VAMC's Project Manager). If primer, then use above "Prime Painting" products.
G. Sand or dull glossy surfaces prior to painting.
H. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise. Confirm Gloss Level (Sheen) prior to selecting body/finish paint type/s.
I. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.

3.8 PAINT COLOR

A. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.
C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel or plastic laminate.

3.9 MECHANICAL AND ELECTRICAL WORK FIELD PAINTING SCHEDULE

A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.

B. In spaces not scheduled to be finish painted in Section 09 06 00, SCHEDULE FOR FINISHES paint as specified under paragraph H, colors.

C. Paint various systems if so specified in Division 15 - PLUMBING and HEATING, VENTILATION AND AIR-CONDITIONING, Division 16 - ELECTRICAL.

D. Paint after tests have been completed.

E. Omit prime coat from factory prime-coated items.

F. Finish painting of mechanical and electrical equipment is not required when located in interstitial spaces, above suspended ceilings, in concealed areas such as pipe and electric closets, pipe basements, pipe tunnels, trenches, attics, roof spaces, shafts and furred spaces except on electrical conduit containing feeders 600 volts or more.

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

H. Color:
1. Paint items having no color specified in Section 09 06 00, SCHEDULE FOR FINISHES to match surrounding surfaces.
2. Paint colors as specified in Section 09 06 00, SCHEDULE FOR FINISHES except for following:
   a. White .....Exterior unfinished surfaces of enameled plumbing fixtures. Insulation coverings on breeching and uptake inside boiler house, drums and drum-heads, oil heaters, condensate tanks and condensate piping.
   b. Gray: .....Heating, ventilating, air conditioning and refrigeration equipment (except as required to match surrounding surfaces), and water and sewage treatment equipment and sewage ejection equipment.
   c. Aluminum Color: Ferrous metal on outside of boilers and in connection with boiler settings including supporting doors and door

frames and fuel oil burning equipment, and steam generation system (bare piping, fittings, hangers, supports, valves, traps and miscellaneous iron work in contact with pipe).

d. Federal Safety Red: Exposed fire protection piping hydrants, post indicators, electrical conducts containing fire alarm control wiring, and fire alarm equipment.

e. Federal Safety Orange: .Entire lengths of electrical conduits containing feeders 600 volts or more.

f. Color to match brickwork sheet metal covering on breeching outside of exterior wall of boiler house.

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

1. Exterior Locations:

a. Apply two coats of MPI 9 (Exterior Alkyd Enamel (EO)) to the following ferrous metal items:
Vent and exhaust pipes with temperatures under 94 degrees C (200 degrees F), exposed piping and similar items.

b. Apply two coats of MPI 119 (Exterior Latex, High Gloss (acrylic) (AE)) to galvanized and zinc-copper alloy metal.

2. Interior Locations:

a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) to following items:

1) Metal under 94 degrees C (200 degrees F) of items such as bare piping, fittings, hangers and supports.

2) Equipment and systems such as hinged covers and frames for control cabinets and boxes, electric conduits and panel boards (if not factory finished; verify with VAMC's Project Manager).

3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.

b. Paint electrical conduits containing cables rated 600 volts or more using two coats of MPI 9 (Exterior Alkyd Enamel (EO)) or MPI 94 (Exterior Alkyd, Semi-gloss (EO)) in the Federal Safety Orange color in exposed and concealed spaces full length of conduit.

3.10 BUILDING WORK FIELD PAINTING

A. Painting and finishing of interior Work except as specified under paragraph 3.11 B.

1. Painting and finishing of new and existing work including colors and gloss of finish selected is specified in Finish Schedule, Section 09 06 00, SCHEDULE FOR FINISHES.

2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.

3. Painting of ferrous metal and galvanized metal.

4. Identity painting and safety painting.

B. Building and Structural Work not Painted:

1. Prefinished items:
   a. Factory-finished equipment, casework (countertop). and similar items specified factory finished under other sections.
2. Finished surfaces:
   a. Hardware except ferrous metal.
   b. Anodized aluminum, stainless steel, chromium plating, copper, and brass, except as otherwise specified.
   c. Signs, fixtures, and other similar items integrally finished.
3. Concealed surfaces:
   a. Inside duct shafts (except VAMC's Project Manager has right to direct flat-black painting of visible-to-finished-area duct interiors), interstitial spaces, crawl spaces, pipe tunnels, above ceilings, except as otherwise specified or directed.
   b. Inside walls or other spaces behind access doors or panels.
   c. Surfaces concealed behind permanently installed casework and equipment.
4. Moving and operating parts:
   a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
5. Labels:
   a. Code required label, such as Underwriters Laboratories Inc., Inchcape Testing Services, Inc., or Factory Mutual Research Corporation.
   b. Identification plates, instruction plates, performance rating, and nomenclature.
6. Gaskets.
7. Structural steel encased or otherwise concealed from view.
8. Ceilings, walls, columns in interstitial spaces.

3.11 IDENTITY PAINTING SCHEDULE (coordinate 3.11 with Mechanical and Electrical Specifications. See "Note" in opening statement to Paragraph A. 6 below). The following, as applicable (editing of following Standard Specification was minimal):

A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.

1. Legend may be identified using 2.1 G options or by stencil applications.
2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories

such as valves, regulators, strainers and cleanouts a minimum of 12 000 mm (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.

3. Locate Legends clearly visible from operating position.
4. Use arrow to indicate direction of flow.
5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on drawings where asterisk appears for High, Medium, and Low Pressure designations as follows:
   a. High Pressure - 414 kPa (60 psig) and above.
   b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
   c. Low Pressure - 103 kPa (14 psig) and below.
   d. Add Fuel oil grade numbers.
6. Legend name in full or in abbreviated form as follows: **Note**: Paragraphs under 3.11 shall be utilized to the extent that such color and lettering is not addressed adequately in the Mechanical or Electrical Specifications. Use the following for clarification, comparison, or implementation (verify all with VAMC's Project Manager):

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND BBREVIATIONS
Blow-off		Yellow	Black	Blow-off
Boiler Feedwater		Yellow	Black	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Yellow	Black	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Yellow	Black	H.P. _____*
High Pressure Condensate Return		Yellow	Black	H.P. Ret ____*
Medium Pressure Steam		Yellow	Black	M. P. Stm ____*
Medium Pressure Condensate Return		Yellow	Black	M.P. Ret _____*
Low Pressure Steam		Yellow	Black	L.P. Stm _____*
Low Pressure Condensate Return		Yellow	Black	L.P. Ret _____*
High Temperature Water Supply		Yellow	Black	H. Temp Wtr Sup
High Temperature Water Return		Yellow	Black	H. Temp Wtr Ret
Hot Water Heating Supply		Yellow	Black	H. W. Htg Sup

Hot Water Heating Return		Yellow	Black	H. W. Htg Ret
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Vacuum Condensate Return		Yellow	Black	Vac Cond Ret
Fuel Oil - Grade		Green	White	Fuel Oil-Grade __*
Boiler Water Sampling		Yellow	Black	Sample
Chemical Feed		Yellow	Black	Chem Feed
Continuous Blow-Down		Yellow	Black	Cont. B D
Pumped Condensate		Black		Pump Cond
Pump Recirculating		Yellow	Black	Pump-Recirc.
Vent Line		Yellow	Black	Vent
Alkali		Yellow	Black	Alk
Bleach		Yellow	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Yellow	Black	Acid Waste
Vent		Yellow	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler		Red	White	Auto Spr

Standpipe	Red	White	Stand
Sprinkler	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6100 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class 5000, 15000, or 25000, as appllicable.
8. See Sections for methods of identification, legends, and abbreviations of the following:
   a. Regular compressed air lines: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
   b. Dental compressed air lines: Section 22 61 13.74, DENTAL COMPRESSED-AIR PIPING / Section 22 61 19.74, DENTAL COMPRESSED-AIR EQUIPMENT.
   c. Laboratory gas and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
   d. Oral evacuation lines: Section 22 62 19.74, DENTAL VACUUM AND EVACUATION EQUIPMENT.
   e. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES / Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
   f. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS / Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS / Section 28 05 33, RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY.

B. Identify columns in interstitial space, whether concealed or not:
   1. Apply stenciled "Column".
   2. Paint letters 100 mm (4 inches) high, locate 450 mm (18 inches) below overhead structure.
   3. Apply on exposed sides of interior columns or column cladding (or enclosing walls), and on inside face only of exterior columns, if any.
   4. Color:
      a. Use contrasting color on columns.

3.12 PROTECTION CLEAN UP, AND TOUCH-UP

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work that was damaged or discolored.

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APPENDIX

For reference during bidding and construction, refer to the following abbreviations that may be used in Section 09 91 00, PAINTING and in other Sections, especially Section 09 06 00, SCHEDULE FOR FINISHES. Defer to VAMC's Project Manager or Architect for clarification/determination.

Paint or coating, #*	Abbreviation (with additional Project notes)
Acrylic Emulsion, 5/6	AE (MPI 11 - semigloss; or MPI 119 - gloss) - for **Hollow-Metal** (Contractor Options).
Latex Emulsion, 1/3/5	LE (MPI 53, flat; or MPI 52, eggshell; or MPI 54, semigloss - **MPI 54 is for New and Repainted "Isolated" Non-Corridor Walls**; MPI 52/53 if/as verified for matching existing Corridor Wall paint.
Latex Semi-gloss, 5	SG (MPI 141) - for Hollow-Metal only if approved by VAMC's Project Manager (do not use MPI 141 without specific approval).
Latex Flat, 2	LF (MPI 44) - if/as verified for matching existing Corridor Wall paint.
Latex Low Luster, 4	LL (MPI 43) - if/as verified for matching existing Corridor Wall paint.

* Gloss Levels:

1 = flat/matte finish
2 = velvet-like finish
3 = egg-shell finish
4 = satin-like finish
5 = semi-gloss finish
6 = gloss finish
7 = high-gloss finish

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies wall handrail/wall-guard combinations (if/as needed for replacement regarding relocation of existing units), corner guards, and high-impact wall covering (wainscot).

1.2 RELATED WORK

A. Door kick plates are specified in Section 08 71 00, DOOR HARDWARE.

B. Color and texture of materials: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, if/as requested by VAMC's Project Manager, except color sample of FRP wainscot is required.

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Handrail/Wall-Guard Combinations.
2. Corner Guards.
3. High-Impact Wall covering (wainscot)

D. Samples: Color/Texture sample of FRP wainscot is required.

E. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

1.4 DELIVERY AND STORAGE

A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.

B. Protect from damage from handling and construction operations before, during and after installation.

C. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

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

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B221-07.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

D256-06.....Impact Resistance of Plastics

D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

E84-07.....Surface Burning Characteristics of Building Materials

C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

D. Underwriters Laboratories Inc. (UL):
Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A167, Type 302B.

B. Aluminum Extruded (only if/as needed for replacement of handrail/wall-guard components): ASTM B221, Alloy 6063, Temper T5 or T6.

C. Resilient Material, Handrail/Wall-Guard (if any); verify the following:

1. Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements:
   a. Minimum impact resistance of 1197 ps (25 ft lbs per sq.ft) when tested in accordance with ASTM D256 (Izod impact, ft.lbs. per inch notch).
   b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
   c. Rated self extinguishing when tested in accordance with ASTM D635.
   d. Material shall be labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
   e. Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.
   f. Same finish on exposed surfaces.

D. Resilient Material, Wainscot (Fiberglass Reinforced Plastic, "FRP"):

1. Extruded and/or injection molded Isophathalic Fire-Rated Polyester with bidirectional or multi-directional woven and/or chopped strand fiberglass reinforcement:
   a. Minimum impact resistance of 1197 ps (10.6 ft lbs per sq.ft) when tested in accordance with ASTM D256 (Izod impact, ft.lbs. per inch notched).
   b. Class A (1) fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
   c. Rated self extinguishing when tested in accordance with ASTM D635.

d. Material shall be labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.

e. Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

2.2 FINISHES

A. In accordance with NAAMM AMP 500 series, as applicable.

B. Aluminum (handrail/wall-guard if needed):

1. Exposed aluminum: AAC22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mil thick.
2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.

C. Stainless Steel: NAAMM finish Number 4.

D. Wainscot (FRP): Textured (not smooth) finish, color "white" (non-toned white), as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

2.3 CORNER GUARDS ("C.G.")

A. Stainless-Steel Corner Guards: Fabricate of 1.6 mm (0.0625-inch) thick stainless steel. Form guards of dimensions and to contour shown and required; field verification required:

1. See Project Drawings C/A1 Floor Plan (and Detail 1/A1) and E/A1 Interior Elevation for two corner-guard locations.
   a. Custom C.G. length required to match/coordinate with wainscot height and detailing (important: see E/A1).
   b. Custom leg dimension might be required on C.G. behind Door #5.

2.4 COMBINATION HANDRAIL/WALL-GUARD

A. This Specification will only be utilized if a problem is encountered in the relocation of existing handrail/wall-guard components, or if the extent of such Work is extended by Addendum or Change Order. In either event, Contractor shall confirm and coordinate with VAMC Project Manager regarding matching new units to existing units. Therefore the following specifications may not meet Project needs entirely, and are intended only as a guide for on-going reference before and during construction.

1. Combination Handrail/Wall-Guard: Snap-on covers of resilient material, minimum 2 mm (0.078-inch) thick, shall be free-floated on a continuous, extruded aluminum retainer, minimum 1.8 mm (0.072-inch) thick, anchored to wall at maximum 760 mm (30 inches) on center.
2. Provide handrail/wall-Guard units with prefabricated and closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories as required. End caps and corners shall be field adjustable to assure close alignment with handrails and wall guards (crash rails). Screw or bolt closure caps to aluminum retainer.

2.5 HIGH-IMPACT WALL COVERING

A. Fabricate from Fiberglass Reinforced Plastic sheets or rolled sheet, "FRP" (see 2.1 D. above).

B. Coordinate with corner guard supplier and installer for proper fit at outside corners.

C. Provide adhesive as recommended by the FRP manufacturer.

2.6 FASTENERS AND ANCHORS

A. Provide fasteners and anchors as required for each specific type of installation.

B. Where type, size, spacing or method of fastening is not shown or specified, submit shop drawings showing proposed installation details.

PART 3 - INSTALLATION

3.1 STAINLESS STEEL CORNER GUARDS

A. Mount guards on external corners of interior walls/partitions as shown on drawings(two corner guards in this Project, unless changed by Addendum or Change Order).

1. See 2.2 above regarding important size and coordination matters.

B. Confirm mounting requirements and submit such for approval. Corner guards shall overlap finish GWB surfaces.

1. Clean surfaces to receive corner guards and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on FRP substrate. Remove excess adhesive from around edge of guard and allow to cure undisturbed for length specified in manufacturers' printed instructions.

3.2 RESILIENT HANDRAIL/WALL-GUARD COMBINATIONS

A. Secure guards to walls with brackets and fasteners in accordance with manufacturer's details and instructions. Verify mounting requirements on site and coordinate installation as necessary.

3.3 HIGH-IMPACT WALL COVERING (FRP WAINSCOT)

A. Surfaces to receive high-impact wall covering shall be clean, smooth and free of obstructions.

1. Inspect substrate wall surfaces to insure that surfaces are clean, flat, dry, and smooth (do not proceed unless/until satisfactory).

B. Preconditioning and Expansion/Contraction: Precondition panels prior to installation, allowing for expansion and contraction during installation.

C. Tools and Personal-Protection: Cut with power saws and carbide-tip blade, or as manufacturer recommends. Drill with bit recommended by manufacturer. Protect eyes with goggles and cover mouth with filter mask when cutting fiberglass panels. Take other precautions during installation as recommended by manufacturer of panels.

D. Installation:

1. Use adhesive-and-fastener application method unless otherwise recommended by manufacturer for highest-quality installation. Follow manufacturer's recommendations and instructions applicable to approved submittals.
   a.) Apply with adhesive in controlled environment according to manufacturer's recommendations.
2. Panels: Set first panel installed true with plumb line. Cut panels as required for installation.
3. Trim Moldings/Sealant: Use approved moldings at all exposed edges, cutting moldings as needed. Place molding on panel before fastening, using silicone sealant at all moldings; remove excess sealant during installation or trim-off after sealant has cured.

E. Cleaning: Use only cleaners and methods approved by panel manufacturer, taking care not to use any abrasive cleaners, and so forth, which are not specifically recommended by the manufacturer.

F. Protection: Advise Contractor as to necessary protection of the wainscot Work for the remainder of construction, making sure that the Contractor is fully aware of any subsequent cleaning times or methods, by the Contractor or Subcontractors, which may pose a damage risk to the finish.

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION - see also 3.3 SCHEDULE OF ACCESSORIES below

A. This section specifies manufactured restroom-type items.

B. Items Specified to be furnished and installed under this Project include (indicates abbreviation on Drawings):

1. Grab Bars ("G.B.").
2. Clothes hooks, robe or coat ("R.H.").
3. Metal-framed mirror.
4. Feminine-Napkin Disposal ("FND").

C. Items provided by VA, with installation by Contractor under this Project include:

1. Paper towel dispensers ("TD").
2. Soap Dispensers ("S").
3. Toilet-Tissue Dispenser ("TP").

1.2 RELATED WORK

A. Contractor shall provide and install backing support for all items specified in this Section 10 28 00 (concealed in wall, behind GWB).

B. Color of finishes: Section 09 06 00, SCHEDULE FOR FINISHES

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings (if/as VAMC Project Manager requests):

1. Product/s specified if/as requested).
2. Show material details of construction, installation and anchorage of product/s.

C. Samples (only if VAMC Project Manager requests):

1. One of each type of accessory specified.
2. After approval, samples may be used in the work.

D. Manufacturer's Literature and Data:

1. All accessories specified.
2. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.
3. Show working operations of spindle for toilet-tissue dispensers (only if TP added by Addendum (provided by VA at time of writing the Specification).

1.4 QUALITY ASSURANCE

A. Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each accessory type shall be the same and be made by the same manufacturer.

C. Each accessory shall be assembled to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 PACKAGING AND DELIVERY

A. Pack accessories individually to protect finish.

B. Deliver accessories to the project only when installation work in rooms is ready to receive them.

C. Deliver inserts and rough-in frames to site at appropriate time for building-in.

D. Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

1.6 STORAGE

A. Store products in weathertight and dry storage facility.

B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

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

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

A176-99(R2004).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

A269-07.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A312/A312M-06.....Seamless and Welded Austenitic Stainless Steel Pipes

A653/A653M-07.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

B221-06.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-03.....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C1036-06.....Flat Glass

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

F446-85 (R2004).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

A269-07.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

AMP 500-505-88.....Metal Finishes Manual and Finishes for Stainless Steel

D. American Welding Society (AWS):

D10.4-86 (R2000).....Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

E. Federal Specifications (Fed. Specs.):

A-A-3002.....Mirrors, Glass

FF-S-107C (2).....Screw, Tapping and Drive

FF-S-107C.....Screw, Tapping and Drive.

WW-P-541E(1).....Plumbing Fixtures (Accessories, Land Use) Detail Specification

PART 2 - PRODUCTS

2.1 MATERIALS, as applicable:

A. Aluminum: ASTM B221, alloy 6063-T5 and alloy 6463-T5.

B. Stainless Steel:

1. Plate or sheet: ASTM A167, Type 302, 304, or 304L, except ASTM A176 where Type 430 is specified, 0.0299-inch thick unless otherwise specified.
2. Tube: ASTM A269, Alloy Type 302, 304, or 304L.

C. Stainless Steel Tubing: ASTM A269, Grade 304 or 304L, seamless or welded.

D. Stainless Steel Pipe: ASTM A312; Grade TP 304 or TP 304L.

E. Steel Sheet: ASTM A653, zinc-coated (galvanized) coating designation G90.

F. Glass:

1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

2.2 FASTENERS

A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.

B. Concealed Fasteners: Steel, hot-dip galvanized.

C. Toggle Bolts: For use in hollow masonry or frame construction.

D. Hex bolts: For through bolting on thin panels.

E. Screws:

1. ASME B18.6.4.
2. Fed Spec. FF-S-107, Stainless steel Type A.

F. Adhesive: As recommended by manufacturer for products to be joined.

2.3 FINISH, if/as applicable to submittals and approvals

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

1. AA-C22A41 Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick.
2. AA-C22A44 Chemically etched medium matte with electrolytic ally deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish. Dyes will not be accepted.

C. AA-M32 Mechanical finish, medium satin.

1. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
2. Stainless Steel: NAAMM AMP 503, finish number 4.
3. Ferrous Metal:
   a. Shop Prime: Clean, pretreat and apply one coat of primer and bake.
   b. Finish: Over primer apply two coats of alkyd or phenolic resin enamel, and bake.
4. Nylon Coated Steel: Nylon coating powder formulated for a fluidized bonding process to steel to provide a hard smooth, medium gloss finish, not less than 0.3 mm (0.012-inch) thick, rated as self-extinguishing when tested in accordance with ASTM D635.

2.4 FABRICATION - GENERAL

A. Welding, AWS D10.4.

B. Grind dress, and finish welded joints to match finish of adjacent surface.

C. Form exposed surfaces from one sheet of stock, free of joints.

D. Provide steel anchors and components required for secure installation.

E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents.

F. Isolate aluminum, if any, from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.

G. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.

H. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.

I. Key items alike (only applicable if lockable accessories added by addendum or Change Order.

J. Provide templates and rough-in measurements as required.

K. Round and deburr edges of sheets to remove sharp edges.

2.5 PAPER TOWEL DISPENSERS (only if by Addendum or Change Order)

A. Surface-mounted type with sloping top.

B. Dispensing capacity for 300 sheets of any type of paper toweling.

C. Fabricate of stainless steel.

D. Provide door with continuous hinge at bottom, and either spring tension cam lock or tumbler lock, keyed alike, at top and a refill sight slot in front.

2.6 TOILET TISSUE DISPENSERS (only if by Addendum or Change Order)

A. Double roll surface mounted type.

B. Mount on continuous backplate.

C. Removable spindle ABS plastic or chrome plated plastic.

D. Wood rollers are not acceptable.

2.7 GRAB BARS

A. Fed. Spec WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and ASTM F446.

B. Fabricate of either stainless steel or nylon coated steel, except use only one type throughout the Project:

1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.
2. Nylon Coated Steel: Grab bars and flanges complete with mounting plates and fasteners. Color is specified under Section 09 06 00, SCHEDULE FOR FINISHES (open for selection during submittal process).

C. Concealed mount.

D. Bars:

1. Fabricate from 38 mm (1-1/2 inch) outside diameter tubing.
   a. Stainless steel, minimum 1.2 mm (0.0478 inch) thick.
   b. Nylon coated bars, minimum 1.5 mm (0.0598 inch) thick.
2. Fabricate in one continuous piece with ends turned toward walls.
3. Continuous weld intermediate support to the grab bar.

E. Flange for Concealed Mounting:

1. Minimum of 2.65 mm (0.1046 inch) thick, approximately 75 mm (3 inch) diameter by 13 mm (1/2 inch) deep, with provisions for not less than three set screws for securing flange to back plate.

2. Insert grab bar through center of the flange and continuously weld perimeter of grab bar flush to back side of flange.

F. Back Plates:
1. Minimum 2.65 mm (0.1046 inch) thick metal.
2. Fabricate in one piece, approximately 6 mm (1/4 inch) deep, with diameter sized to fit flange. Provide slotted holes to accommodate anchor bolts.

2.8 CLOTHES HOOKS, ROBE OR COAT

A. Fabricate hook units either of stainless steel, using 6 mm (1/4 inch) minimum thick stock, with edges and corners rounded smooth to the thickness of the metal, or 3 mm (1/8 inch) minimum radius.

B. Fabricate each unit as a double hook on a single shaft, integral with or permanently fastened to the wall flange, provided with concealed fastenings.

2.9 METAL FRAMED MIRRORS

A. 18"-wide x 36"-high, Fed. Spec. A-A-3002 metal frame; chromium finished steel, anodized aluminum or stainless-steel, type 302 or 304.

B. Mirror Glass:
1. Minimum 6 mm (1/4 inch) thick, tempered.
2. Set mirror in a protective vinyl glazing tape.

C. Frames:
1. Channel or angle shaped section with face of frame not less than 9 mm (3/8 inch) wide. Fabricate with square corners.
2. Use either 0.9 mm (0.0359 inch) thick stainless steel, chrome finished steel, or extruded aluminum, with clear anodized finish 0.4 mils thick.
3. Filler (only applicable if wainscot location is changed during construction; no wainscot at mirror on Project Drawings):
   a. Where mirrors are mounted on walls having wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface. Fabricate fillers from same material and finish as the mirror frame, contoured to conceal the void behind the mirror at sides and top.

D. Back Plate:
1. Fabricate backplate for concealed wall hanging of either zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame, and furnish with theft resistant concealed wall fastenings.
2. Use set screw type theft resistant concealed fastening system for mounting mirrors.

E. Mounting Bracket:

1. Designed to support mirror tight to wall.
2. Designed to retain mirror with concealed set screw fastenings.

2.10 FEMININE-NAPKIN DISPOSAL

A. Surface-mounted type.

B. Fabricate of stainless steel.

C. Provide one manufacturer's carton of disposable liners for Project.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before starting work notify VAMC's Project Manager in writing of any conflicts detrimental to installation or operation of units.

B. Verify with VAMC's Project Manager the exact location of accessories.

3.2 INSTALLATION

A. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.

C. Install accessories plumb and level and securely anchor to substrate.

D. Install accessories in a manner that will permit the accessory to function as designed and allow for servicing as required without hampering or hindering the performance of other devices.

E. Align mirrors, dispensers and other accessories even and level, when installed in battery (as approved by VAMC's Project Manager).

F. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 SCHEDULE OF ACCESSORIES

A. 137, **Unisex Restroom**:
   1. Provided and installed by Contractor:
      3 Grab Bars ("G.B."): 18"-, 36"-, and 42"-long.
      1 Clothes hook, robe or coat ("R.H."): Install on door.
      1 Metal-framed mirror.
      1 Feminine-Napkin Disposal ("FND").
   2. Provided by VA; installed by Contractor:
      1 Paper towel dispenser ("TD").
      1 Soap Dispenser ("S").
      1 Toilet-Tissue Dispenser ("TP").

B. 138-2, **Soiled Utility**:
   1. Provided by VA; installed by Contractor:
      1 Paper towel dispenser ("TD").
      1 Soap Dispenser ("S").

3.4 CLEANING

A. After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

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SECTION 12 36 00
COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies casework countertops with integral accessories by the Plumbing Subcontractor.

B. Integral accessories (by Plumbing Subcontractor) include:

1. Sink with trap and drain.

1.2 RELATED WORK

A. Color/patterns of plastic laminate: SECTION 09 06 00, SCHEDULE FOR FINISHES.

B. DIVISION 15, MECHANICAL.

1.3 SUBMITTALS

A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings (if requested by VAMC Project Manager)

1. Show dimensions of section and method of assembly.
2. Show details of construction at 1/2 scale.

C. Samples, full sample array required first for selection (then follow-up confirmation sample/s if/as requested):

1. 150 mm (6 inch) square, or approved, samples of plastic laminate.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced and applicable to this Project. Publications are referenced in the text by the basic designation only.

B. American Hardboard Association (AHA):

A135.4-04.....Basic Hardboard

C. Composite Panel Association (CPA):

A208.1-99.....Particleboard

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

D256-06.....Pendulum Impact Resistance of Plastic
D570-98(R2005).....Water Absorption of Plastics
D638-03.....Tensile Properties of Plastics
D785-03.....Rockwell Hardness of Plastics and Electrical Insulating Materials
D790-07.....Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D4690-99(2005).....Urea-Formaldehyde Resin Adhesives
G21-96 (R2002).....Determining Resistance of Synthetic Polymeric Materials to Fungi

E. Federal Specifications (FS):
A-A-1936.....Adhesive, Contact, Neoprene Rubber

F. U.S. Department of Commerce, Product Standards (PS):
PS 1-95.....Construction and Industrial Plywood
LD 3-05.....High Pressure Decorative Laminates
LD 3.1-95.....Performance, Application, Fabrication, and Installation of High Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plastic Laminate: NEMA LD 3.
1. Concealed backing sheet Type BKL.
2. Decorative surfaces:
a. Flat components: Type GP-HGL.
b. Post forming: Type PF-HGP.
3. Chemical Resistant Surfaces
a. Flat components: Type GP-HGL.
b. Post forming: Type PF-HGP.
c. Resistance to reagents:
1) Minimum height of impact resistance: 300 mm (12 inches).

B. Particleboard: CPA A208.1, Grade 2-M-2.

C. Plywood: PS 1, Exterior type, veneer grade AC not less than five ply construction.

D. Hardboard: AHA A135.4, Type I, tempered, fire retardant treated, smooth surface one side.

E. Adhesive
1. For plastic laminate FS A-A-1936.

F. Fasteners:
1. Metals used for welding same metal as materials joined.
2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.

G. Sealant: Clear silicone or as otherwise approved (submit for approval).

2.2 COUNTERTOPS

A. Fabricate in largest sections practicable. Main deck of Project counter shall be fabricated in one section (not including backsplashes, bracing, and so forth) unless VAMC's Project Manager approves otherwise.

B. Fabricate with joints flush on top surface, if any (see A. above).

C. Fabricate countertops to overhang front of cabinets as indicated on drawings.

D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (if any).

E. Join any edges in waterproof cement or epoxy cement.

F. Fabricate with end splashes against walls (see drawings).

G. Splash Backs and End Splashes ("Backsplashes"):

1. Not less than 19 mm (3/4 inch) thick.
2. Height 100 mm (4 inches) unless noted otherwise.

H. Drill or cutout for sinks and penetrations (see drawings).

1. Accurately cut for size of penetration, coordinating with Plumbing Subcontractor as required.

I. Plastic Laminate Countertops:

1. Fabricate plastic laminate on five-ply plywood or particleboard core 19 mm (3/4 inch) thick with plastic laminate backing sheet.
2. Exposed Surface and edges of decorative laminated plastic.
   a. Use decorative surface tops when noted plastic laminate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installing countertops verify that wall surfaces have been finished as specified and that mechanical and electrical service locations are as required.

B. Secure countertops to supporting construction with metal fastening devices, or screws through pierced slots in rails (verify/coordinate requirements).

1. Submit shop drawings or other information clearly showing proposed fastenings and method of installation.
2. Use round head bolts or screws, or otherwise, as approved.
3. Use wood or sheet metal screws for wood or plastic laminate tops; minimum penetration into top 16 mm (5/8 inch), screw size No 8, or 10.

3.2 PROTECTION AND CLEANING

A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.

B. Clean at completion of work.

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JONATHAN M. WAINWRIGHT MEMORIAL VAMC, WALLA WALLA, WA
PROJECT 08-115: "ENHANCE OUTPATIENT SECURITY" (BLDG. #74)
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SECTION 15010 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 SCOPE OF WORK – GENERAL

A. This section specifies general requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in sections of Division 1.

B. Provide materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of mechanical work indicated and described in the Contract Documents.

C. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, provide material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned or not.

1.3 SEQUENCE OF WORK

A. Conduct work in sequence to provide least possible interference to the activities of the Owner, and to permit orderly transfer of activities and equipment to completed areas.

B. Work shall be substantially complete by the dates listed in Division 1 Section, "Summary".

1.4 DEFINITIONS

A. Provide: Furnish and install complete and ready for intended use.

B. Indicated: Indicated on drawings.

C. Noted: Noted on Drawings or in Specifications.

D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

E. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

F. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

G. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

H. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.5 CODES AND STANDARDS

A. Code Compliance: Comply with most current adopted edition of following:

1. International Building Code (IBC), Standards and Amendments.
2. International Mechanical Code (IMC), Standards and Amendments.
3. International Fire Code (IFC), Standards and Amendments.
4. Uniform Plumbing Code (UPC), Standards and Amendments.
5. National Fire Protection Association (NFPA).
6. National Electrical Code (NEC); NFPA 70.
7. Applicable State and local codes, laws and ordinances.

1.6 SAFETY OF PERSONS AND PROPERTY

A. Comply with applicable laws, ordinances, rules and regulations of any public authority for the safety of persons and property, including requirements of the Washington Industrial Safety and Health Administration (WISHA) and/or the Occupational Safety and Health Act (OSHA) and Division 1, General and Supplementary Conditions.

1.7 PERMITS AND FEES

A. Obtain and pay for required permits and fees necessary to fully complete work included in the Contract Documents.

1.8 INTENT AND INTERPRETATION

A. Drawings and Specifications supplement each other and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.

B. Drawings are partly diagrammatic and do not necessarily show exact location of new piping and existing utilities, unless specifically dimensioned.

C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of equipment. They shall not be used for obtaining quantities or lineal runs of piping.

D. Grilles, fixtures or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.

E. Location of piping and ductwork shall be checked to determine that it clears openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.

F. Mechanical drawings shall serve as working drawings for Division 15 work. Refer to Architectural, Structural, Civil, Landscape and Electrical drawings for additional detail affecting the installation of work. Architectural drawings shall take precedence over the Mechanical drawings if any dimensional discrepancies exist.

G. Approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details in regard to location. Exact locations are to be determined by actual measurements at the building. Not all pipe and duct offsets are indicated on the drawings.

1.9 SUBMITTAL OF EQUIPMENT FOR APPROVAL

A. Refer to Division 1 Section, "Submittal Procedures" for submittal definitions, requirements and procedures. Additional requirements are listed below.

1.10 GUARANTEE

A. Guarantee satisfactory operation of material and equipment installed under Division 15. Repair or replace any defective materials, equipment, or workmanship which may show itself within one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

A. Where more than one manufacturer is listed, provide products of only one manufacturer for each type of product.

B. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Outdated "new" equipment is not acceptable.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2.2 EQUIPMENT AND MATERIAL SUBSTITUTIONS

A. Throughout these Contract Documents, various materials, equipment, apparatus, etc., are specified by manufacturer, brand name, type or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of the bid.

B. Where more than one manufacturer is listed, and only one manufacturer's catalog number is indicated, that standard of quality and construction shall be maintained by materials supplied by other manufacturer(s).

C. Substitutions of equipment or materials shall be made only with written prior approval. Prior approval requests must be received at least ten (10) days prior to bid date unless otherwise instructed. Refer to Division1 Section, "Product Requirements" for procedures in requesting substitutions.

D. Acceptance of substitution request signifies manufacturer recognition only. No attempt has been made to check each item as to special features, capacities, or physical dimensions required by this project. Verify requirements before submitting for approval. Acceptance of exact features, sizes, capacities, etc., all of which must meet or exceed design requirements will be determined when submitted during the construction phase.

E. The Contractor shall bear full responsibility for substituted equipment and materials, including, but not limited to:

1. Costs.
2. Available space requirements
3. Effect on other trades
4. Changes in electrical requirements
5. Changes in structural requirements.

PART 3 - EXECUTION

3.1 COORDINATION

A. Refer to Division 1 Section "Project Management And Coordination".

B. Coordinate available space for equipment and systems with other trades. Refer to Architectural, Structural and Electrical Drawings for additional building details necessary for coordination.

C. Cutting, patching, wiring, finishing or any other work required for relocation of work installed due to interferences between work of the various trades will be at no additional cost to the Owner.

3.2 MANUFACTURER'S INSTRUCTIONS

A. Furnish proper equipment and/or materials required for installation as intended by the manufacturer, for all work described under Division 15. If needed for proper installation or operation, request advice and supervisory assistance from the representative of the specific manufacturer. Manufacturer's published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment. Promptly notify the Architect in writing of any conflict between the requirements of the Contract Documents and the manufacturer's directions and obtain the Architect's instructions before proceeding with the work.

3.3 EXAMINATION OF SITE

A. Visit site of proposed work and become familiar with conditions affecting work. Verify measurements at the building before beginning work.

3.4 EXISTING UTILITIES AND PIPING

A. Locations of existing concealed lines and connection points have been indicated as closely as possible from available information. Assume that such connection points are with in a 10-foot (10') radius of indicated locations. Where connection points are not within this radius, contact the Architect for a decision before proceeding.

3.5 LAYING OUT WORK

A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined from the Construction Drawings. Verify physical dimensions of each item of mechanical equipment, ductwork system and piping system, to fit available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordinate equipment to available space and access routes through construction. Offsets or transitions in ductwork or piping systems required for proper system operation and/or installation, whether indicated on drawings or not, shall be provided at no additional cost to Owner.

3.6 REPLACEMENT OF PAVING AND CONCRETE

A. Existing sidewalks, concrete paving, curbs, or asphalt paving removed or damaged during period of installation or as a result thereof, shall be replaced with like material in a manner as directed by and to the satisfaction of the Architect. Comply with Division 2 requirements.

3.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

3.8 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate location of concealed equipment and devices requiring access with location of access panels and doors. Allow ample space for removal of parts that require replacement or servicing.

3.9 TEMPORARY USE OF NEW EQUIPMENT

A. New equipment shall not be used for temporary heating, cooling or ventilation unless authorized in writing by the Owner.

END OF SECTION 15010

SECTION 15015 - MECHANICAL PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

B. Related Sections include the following:

1. Division 1 Section, "Submittal Procedures".
2. Division 1 Section, "Closeout Procedures".

1.2 PROJECT RECORD DOCUMENTS

A. Record differences between mechanical work as installed and as shown in Contract Drawings on a set of prints of mechanical drawings furnished by Architect. Return these prints to Architect at completion of project. Notations made on drawings shall be neat and legible. Comply with Division 1 Section requirements.

B. Mark drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers, and other control devices, filters, motors and similar items requiring periodic maintenance; actual equipment locations; concealed equipment and control devices; mains and branches of piping systems, with valves and control devices located and numbered; actual inverts and locations of underground piping.

C. Revise equipment and fixture schedules on the Drawings to indicate actual installed manufacturer and model numbers.

D. Mark specifications to indicate change orders; actual equipment and materials used.

1.3 OPERATION AND MAINTENANCE MANUALS

A. Prepare and submit Operation and Maintenance (O&M) Manuals for mechanical systems provided. Comply with Division 1 Section requirements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 LUBRICATION

A. Lubricate all pieces of equipment in accordance with Manufacturer's written instructions prior to project closeout. Include a listing of all equipment with the date of final lubrication in Operation and Maintenance manual.

3.2 FINAL CLEANING

A. Refer to Division 1 Section general requirements for final cleaning.

B. At time of final cleanup, clean all fixtures and equipment and leave in condition for use intended. Vacuum cabinet interiors of control panels, air handling units, etc. to remove all construction debris including electrical wiring debris.

END OF SECTION 15015

SECTION 15020 - MECHANICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to work of this section.

B. Related Sections include the following:

1. Division 1 Section, "Summary" for phasing requirements.
2. Division 1 Section, "Cutting And Patching".
3. Division 1 Section, "Selective Demolition" for general demolition requirements and procedures.

1.2 SUMMARY

A. Include all labor, equipment, and materials necessary to complete demolition of existing mechanical systems as shown on the drawings and described herein.

B. Mechanical Services to areas occupied by Owner shall be maintained.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless idicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

PART 2 - SALVAGE

2.1 MATERIALS OWNERSHIP

A. The Owner shall have first salvage rights to all removed fixtures and equipment. Coordinate selection with the Owner's Representative.

B. Except for items or materials to be reused, salvaged, reinstalled or otherwise indicated to remain owner's property, demolished materials shall become Contractor's property and removed from Project site.

C. Transport and legally dispose of off site, all materials resulting from demolition not being salvaged.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Condition and Premises: The Owner assumes no responsibility for condition of areas to be demolished. General conditions existing at time of inspection for bidding purposes will be maintained by Owner.

B. Partial Removal: Items of salvageable value to Contractor indicated to be removed, may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed. Storage or sale of removed items on site will not be permitted.

C. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

D. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

E. Existing Utility Services: Maintain existing utilities indicated to remain, keep in service and protect against damage during demolition operations.

F. Cut and/or patch and repair all existing floor, wall and roof penetrations not being re-used. Comply with Division 1 Section requirements.

G. All roof penetrations that are re-used shall be inspected and made air and water tight.

H. Not all piping, ductwork or equipment items are shown on drawings. Other demolition may be required.

I. Any existing ductwork or piping that is to be reused or left in existing position shall have the opening of such covered and protected during demolition and construction until final connections can be made.

J. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment. Equipment removal shall include removal of all connecting piping, ductwork, etc., either to a point below floor behind wall surface, etc.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

K. If pipe, insulation, or equipment to remain is damaged in appearance during construction, or is rendered unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

END OF SECTION 15020

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Escutcheons.
6. Equipment installation requirements common to equipment sections.
7. Supports and anchorages.
8. Access doors.
9. Through-penetration fire stop systems.
10. Cutting and patching.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.5 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B 32, lead-free; 95.6% tin/4% copper/0.4% silver solder; 440-500 deg.F melting range.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:
   a. Capitol Manufacturing Co.
   b. Central Plastics Company.
   c. Eclipse, Inc.
   d. Epco Sales, Inc.
   e. Hart Industries, International, Inc.
   f. Watts Industries, Inc.; Water Products Div.
   g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:
   a. Capitol Manufacturing Co.
   b. Central Plastics Company.
   c. Epco Sales, Inc.
   d. Watts Industries, Inc.; Water Products Div.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:
   a. Perfection Corp.
   b. Precision Plumbing Products, Inc.
   c. Sioux Chief Manufacturing Co., Inc.
   d. Victaulic Co. of America.

2.5 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.6 ACCESS DOORS

A. Description: Access doors, non-rated and fire-rated for ceiling and wall surfaces.

B. Related sections include the following:

1. Division 15 Section "Duct Accessories" for duct-mounting access doors in HVAC systems.

C. Manufacturers:

1. Acudor Products, Inc.
2. Cesco Products.
3. Elmdor/Stoneman; Div. Of Acorn Engineering Co.
4. Karp Associates.
5. Milcor .

D. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Gypsum board wall and ceiling surfaces.
2. Door: Minimum 0.060 inch thick sheet metal, set flush with exposed face flange of frames.
3. Frame: Minimum 0.060 inch thick sheet metal with 1 inch wide surface-mounted trim.
4. Hinges: Continuous piano hinge.
5. Latch: Screwdriver operated cam latch.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Do not run piping directly over electrical panels or switchgear.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping to permit valve servicing.

H. Install piping at indicated slopes.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install piping to allow application of insulation.

L. Cap or seal temporary openings in piping during construction. Remove caps or seals for final connections.

M. Select system components with pressure rating equal to or greater than system operating pressure.

N. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:
   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
   c. Insulated Piping: One-piece, stamped-steel type with spring clips.
   d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge andset screw or spring clips.
   f. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
2. Existing Piping: Use the following:
   a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
   b. Insulated Piping: Split-plate, stamped-steel type with concealed or exposed-rivet hinge and spring clips.
   c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
   e. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
   f. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.

O. Verify final equipment locations for roughing-in.

P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each threaded valve and at final connection to each piece of equipment.
2. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Section "Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 ACCESS DOORS

A. Provide access doors wherever required to service valves, dampers, fire dampers, motor or any other items of equipment where concealed, unless specifically indicated on the drawings to be furnished under other Section(s).

B. Size and locate access doors for service and maintenance of equipment items to allow adequate access for required service.

C. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

D. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

E. Adjust doors and hardware after installation for proper operation.

3.6 CUTTING AND PATCHING

A. Comply with Division 1 Section, "Cutting And Patching" for general requirements for cutting and patching.

B. Cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.

C. Patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations. will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work.
2. Remove and replace defective work.
3. Remove and replace work not conforming to requirements of the Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect, uncover and restore work to provide for observation of concealed work.

G. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by new work.

H. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

I. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

END OF SECTION 15050

SECTION 15054 – ELECTRICAL PROVISIONS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to work of this section.

B. Related Sections include the following:

1. Division 15 Section "Motors".

1.2 SUMMARY

A. This section specifies basic requirements for field-installed accessory electrical components specified as a part of packaged mechanical equipment. These components include, but are not limited to controllers, motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment, but not factory-installed.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are specified within the individual equipment specifications or scheduled on the drawings.

C. Make all required electrical connections from mechanical equipment to accessory electrical components furnished by manufacturer as a part of equipment but intended to be field-installed, including pushbuttons, pilot lights, interlocks, speed controllers, and similar devices.

D. Provide all required electrical connections of field-mounted float control switches, flow control switches, and similar mechanical/electrical devices provided for pumps and similar mechanical equipment.

E. Provide interconnecting wiring between mechanical equipment shipped in multiple parts and designed by the manufacturer to have field-installed interconnecting wiring.

F. All electrical work shall comply with applicable requirements of Division 16.

1.3 REFERENCES

A. NEMA Standard ICS 2: Industrial Control Devices, Controllers and Assemblies.

B. NEMA Standard 250: Enclosures for Electrical Equipment.

C. NEMA Standard KS 1: Enclosed Switches. Comply with National Electrical Code (NFPA 70).

1.4 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves as required by the individual equipment specification sections.

1.5 QUALITY ASSURANCE

A. All electrical components and materials shall be labeled by an approved testing agency (UL, ETL, CSA, etc.).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with applicable requirements of Division 16 and NFPA 70 (National Electrical Code).

B. Install equipment and wiring per manufacturer's instructions.

END OF SECTION 15054

SECTION 15055 - MOTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENT

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes basic requirements for factory-installed motors.

B. Related Sections include the following:

1. Division 15 Sections for application of motors and reference to specific motor requirements for motor driven equipment.
2. Division 15 Section, "Electrical Provisions for Mechanical Equipment."

1.3 DEFINITIONS

A. Factory installed Motor: A motor installed by motorized equipment manufacturer as a component of equipment.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA, National Electrical Code.

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENT

A. Motor requirement apply to all motors except as follows:

1. Different ratings, performance, or characteristics for a motor are specified in another Section.
2. Manufacturer for a factory installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.

2.2 MOTOR CHARACTERISTICS

A. Motors Smaller than 3/4 HP. Single phase.

B. Frequency Rating: 60 Hz.

C. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

D. Service Factor: 1.15 for open drip-proof motors; 1.0 to totally enclosed motors.

E. Duty: Continuous duty at ambient temperature of 105 deg. F and at altitude of 3300 feet above sea level.

F. Capacity and Torque Characteristics: sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

G. Enclosure: Open drip-proof.

2.3 SINGLE-PHASE MOTORS

A. Type: One of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split-phase start, capacitor run.
3. Capacitor start, capacitor run.

B. Shaded-Pole Motors: For motors 1/20 HP and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, pre-lubricated-sleeve type for other single phase motors.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.
2. Verify bearing lubrication.
3. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
4. Test interlocks and control and safety features for proper operation.
5. Verify that current and voltage for each phase comply with nameplate rating and NEMA MG1 tolerances.

3.2 CLEANING

A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt and debris. Repair damaged finish to match original finish.

B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 15055

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:

B. Related Sections include the following:

1. Division 15 Section(s) " Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

1. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pipe Hangers:
   a. Anvil International, Inc
   b. ERICO/Michigan Hanger Co.
   c. Globe Pipe Hanger Products, Inc.
   d. Hubbard Enterprises/Holdrite
   e. PHD Manufacturing, Inc.
   f. Thomas & Betts.
   g. Tolco Inc.
   h. Unistrut Corp.
2. Channel Support Systems:
   a. Erico/Michigan Co.; O-Strut Div.
   b. Thomas & Betts Corp.
   c. Tolco, Inc.
   d. Unistrut Corp.

3. Thermal Hanger Shield Inserts:
   a. ERICO/Michigan Hanger Co.
   b. PHS Industries, Inc.
   c. Pipe Shields, Inc.
   d. Rilco Manufacturing Company, Inc.
   e. Value Engineered Products, Inc.

2.2 MANUFACTURED UNITS

A. Pipe hangers, Supports and Components: MSS SP-58, factory fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

1. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
2. Nonmetallic Coatings: Plastic coating, jacket or liner.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
2. Nonmetallic Coatings: Plastic Coating, jacket or liner.

C. Thermal Hanger Shield Inserts" 100-psi minimum compressive-strength insulation, encased in sheet metal shield.

1. Material for Cold Piping: ASTM C 552, Type I cellular glass or water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.
2. Material for Hot Piping: ASTM C 552, Type I cellular glass or water-repellent treated, ASTM C 533, Type I calcium silicate.
3. For Trapeze or Clamped Systems: Insert and shield cover entire circumference of pipe.
4. For Clevis or Band Hangers: Insert and shield cover lower 180 degrees of pipe.
5. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use felt, rubber or vinyl padding applied to hangers for piping that is subject to scratching.

F. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
4. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

3.2 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application. Field devised methods shall not be allowed.

C. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

G. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION 15060

SECTION 15080 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes mechanical insulation systems for ductwork, [Type I kitchen hood exhaust ductwork,] equipment, and piping.

1.3 DEFINITIONS

A. ASJ: All-service jacket.

B. FSK: Foil, scrim, kraft paper.

C. PVC: Polyvinyl chloride.

D. SSL: Self-sealing lap.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, identify thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 15 Section "Hangers and Supports."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 INSULATION MATERIALS

A. Refer to Part 3 schedule articles for requirements about where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

1. Products:
   a. CertainTeed Corp.; Duct Wrap.
   b. Johns Manville; Microlite.
   c. Knauf Insulation; Duct Wrap.
   d. Manson Insulation Inc.; Alley Wrap.
   e. Owens Corning; All-Service Duct Wrap.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products:
   a. E-Insulation.
   b. Fibrex Insulations Inc.; Coreplus 1200.
   c. Johns Manville; Micro-Lok.
   d. Knauf Insulation; 1000 deg. Pipe Insulation.
   e. Manson Insulation Inc.; Alley-K.
   f. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

2.3 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.4 TAPES

A. ASJ Tape: White vapor-barrier tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.

B. FSK Tape: Foil-face, vapor-barrier tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136 and UL listed.

C. PVC Tape: White vapor-barrier tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

D. Aluminum-Foil Tape: Vapor-barrier tape with acrylic adhesive and UL listed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.3 COMMON INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or barriers, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 to 6 inches o.c.
   a. For below ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Non-Rated Interior Wall and Partition Penetrations: Install insulation continuously through walls and partitions.

3.5 DUCT AND PLENUM INSULATION INSTALLATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this Article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-barrier integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
6. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
7. Install removable insulating fitting covers on valves, elbows, tees, and flanges, strainers or other irregularly-shaped fittings or components where fitted PVC covers are not practical or available.

3.7 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 4 to 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

D. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
4. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.8 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply, return and outdoor air.
2. Indoor, exposed supply, return and outdoor air.

B. Items Not Insulated:

1. Factory-insulated flexible ducts.
2. Factory-insulated plenums and casings.

3.9 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

A. If more than one material is listed, selection from materials listed is Contractor's option.

B. Service: Supply-air and Return-air ducts, within conditioned space.

1. Material: Mineral-Fiber Blanket.

2. Minimum R-value: R-3.3.
3. Field-Applied Jacket: None.
4. Vapor Barrier Required: Yes.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Fire-suppression piping.
2. Drainage piping located in crawl spaces.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Service: Domestic Hot and Recirculated Hot Water.

1. Operating Temperature: 60 to 140 deg F.
2. Insulation Material: Mineral-Fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:
   a. Runout to fixtures <12 feet, up to 2 inch pipe: 0.5 inch
   b. Pipe, 1 inch and less: 1.0 inch
   c. Pipe, > 1 inch to 2 inch: 1.0 inch
   d. Pipe, > 2 inch:1.5 inch
4. Field-Applied Jacket: PVC for piping exposed in public spaces to 9 feet above floor level.
5. Vapor Barrier Required: None.

C. Service: Domestic Cold Water.

1. Operating Temperature: 35 to 60 deg F.
2. Insulation Material: Mineral-Fiber.
3. Insulation Thickness: Apply the following insulation thicknesses:
   a. Pipe, 2 inch and less: 0.5 inch
   b. Pipe, > 2 inch:1.0 inch
4. Field-Applied Jacket: PVC for piping exposed in public spaces to 9 feet above floor level.
5. Vapor Barrier Required: Yes.

END OF SECTION 15080

SECTION 15110 - VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following general-duty valves:

1. Ball valves.

1.3 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances.

B. Maintenance Data: For each type of valve indicated to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. ASME Compliance for Bronze Valves: ASME B16.24.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Anvil International, "Gruvlok" Series.
2. Conbraco/Apollo Industries
3. Hammond Valve
4. Milwaukee Valve Company
5. NIBCO, Inc.
6. Stockham
7. Victaulic Company of America

2.2 VALVES, GENERAL

A. Valve Type/Manufacturer: Valves of same type shall be of same manufacturer.

B. Refer to Part 3 "Valve Applications" Article for applications of valves.

C. Bronze or Brass Valves: NPS 2 and smaller with threaded or solder-joint ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Lever Handle: For quarter-turn valves NPS 6 and smaller.

G. Extended Valve Stems: On insulated valves.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, General: MSS SP-110.

B. Two-Piece Ball Valves: Bronze body with full port, hard chrome-plated solid brass or bronze ball, reinforced TFE seats and PTFE packing, adjustable packing nut, blowout-proof brass stem, threaded or solder ends; 150 SWP/600 WOG.

1. Milwaukee BA-400/BA-450, or equal.

2.4 BRASS BALL VALVES

A. Brass Ball Valves, General: MSS SP-110.

B. Two-Piece Ball Valves: Forged brass body with full port, hard chrome-plated solid brass or bronze ball, reinforced TFE seats and PTFE packing, adjustable packing nut, blowout-proof brass stem, threaded or solder ends; 150 SWP/400 WOG.

1. Milwaukee BA-475B/BA-485B, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball.

B. If valves with specified SWP or WOG ratings are not available, the same types of valves with higher SWP or WOG ratings may be substituted.

C. DOMESTIC WATER PIPING: Use the following types of valves:

1. Bronze Ball Valves, NPS 3 and Smaller: 600 WOG.
2. Brass Ball Valves, NPS 3 and Smaller: 400 WOG.

D. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded or solder-joint ends. Provide valves with threaded ends for steam, and steam condensate services.

3.3 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install unions adjacent to each threaded end valve and at final connection to each piece of equipment.

F. Install flanges adjacent to flanged valves and at final connections to each piece of equipment.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

3.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 15110

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes domestic water piping inside the building.

B. Related Sections include the following:

1. Division 15 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Service Piping: 160 psig.
2. Domestic Water Distribution Piping: 125 psig.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings.
2. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.3 VALVES

A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.

B. Refer to Division 15 Section "Domestic Water Piping Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Aboveground Domestic Water Piping: Use any of the following piping materials for each size range:

1. NPS 4 and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves.

3.4 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Install copper tubing according to CDA's "Copper Tube Handbook."

C. Install aboveground domestic water piping level without pitch and plumb.

D. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

E. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.

3.5 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, 95-5 tin antimony solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 VALVE INSTALLATION

A. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

E. Install supports for vertical copper tubing every 10 feet.

F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

3.9 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15145- DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Trap seal primer valves
2. Miscellaneous piping specialties

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Piping: 125 psig .

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Maintenance Data: For domestic water piping specialties to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water piping specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed.

2.2 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:

1. Manufacturers:
   a. Josam Co.

b. MIFAB
c. Precision Plumbing Products, Inc.
d. Smith, Jay R. Mfg. Co.
e. Sioux Chief Manufacturing Co.
f. Watts Industries, Inc.

2. 125-psig minimum working pressure.
3. Field serviceable.
4. Activated with a 3 psig pressure drop.
5. Bronze body with atmospheric-vented drain chamber.
6. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
7. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
8. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Vacuum Breaker Type Trap Seal Primer Valves: ASSE 1044, Chrome-plated, cast-brass, NPS 1-1/2, flushometer valve vacuum breaker with NPS 3/8 outlet tubing.

1. Manufacturers:
a. Smith, Jay R. Mfg. Co.
b. Zurn Industries, Inc.

2.3 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

1. Manufacturers:
a. Amtrol, Inc.
b. Smith, Jay R. Mfg. Co.
c. Josam Co.
d. MIFAB
e. Precision Plumbing Products, Inc.
f. Sioux Chief Manufacturing Co., Inc.
g. Watts Industries, Inc.
h. Zurn Industries, Inc.; Wilkins Div.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Trap seal primers are not indicated on the Drawings. Trap seal primers shall be drainage-type used with flushometer valves. At locations remote from a flushometer valve fixture, trap seal primers shall be supply-type trap seal primer valves.

C. Locate trap seal primers in accessible locations. Where located in finished area, conceal in wall and provide access door. Install supply-type trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain, floor-sink, or open-hub drain or other drain body, trap, or inlet fitting. Adjust valve for proper flow.

1. Outlet Piping: Soft copper tube, Type K; CPVC "Gold" Schedule 40 with socket type fittings; or crosslinked polyethylene (PEX) tubing and barbed or compression adapter fittings

D. Size and install water hammer arresters in accordance with manufacturer's recommendations and instructions. Install arresters at quick-closing valves, solenoid valves, and at each plumbing fixture or battery of fixtures in domestic water systems. Arrestors shall be accessible for servicing or replacement.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Install shutoff valve and strainer on suction side of circulator pumps, and check valve and balancing valve on discharge side of pumps. Install valves same size as connected piping.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each backflow preventer according to authorities having jurisdiction and the device's reference standard.

END OF SECTION 15145

SECTION 15150 – SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and to locations indicated.

B. Related Sections include the following:

1. Division 15 Section "Drainage Piping Specialties" for soil, waste, and vent piping systems specialties.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Shielded Couplings: ASTM C 1540 assembly of metal shield or housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

1. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.
   a. NPS 1-1/2 to NPS 4: 3-inch- wide shield with 4 bands.
   b. NPS 5 to NPS 10: 4-inch- wide shield with 6 bands.

c. Husky SD 4000 or Clamp-All 125.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Aboveground, Soil, Waste, and Vent Piping: Use any of the following piping materials for each size range:

1. NPS 1-1/2 to NPS 6: Hubless, cast-iron soil pipe and fittings, heavy-duty stainless steel couplings.

3.2 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Install vent piping free from drops or sags, graded and connected as to drip back by gravity to the drainage pipe it serves.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

F. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Hubless Joints: Make with rubber gasket and sleeve or clamp.

3.4 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Drainage Piping Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union or flange for each connection.

3.6 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

SECTION 15300 - FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 SUMMARY

A. Provide all materials, labor, equipment design and services necessary to perform the installation of the fire protection system as shown on the drawings and as described herein.

B. Related Sections include the following:

1. Division 15 Section "General Mechanical Requirements".
2. Division 15 Section "Basic Mechanical Materials and Methods".
3. Division 16 Section "Fire Alarm and Detection Systems".

1.3 SCOPE OF WORK

A. Modification of existing wet pipe fire sprinkler system as required to accommodate the revised floor plan.

B. Fire sprinkler systems shall be hydraulically calculated, wet pipe systems designed in accordance with NFPA 13 and NFPA 14.

C. Obtain water supply characteristics from the water utility purveyor or authority having jurisdiction where not specifically indicated.

1.4 SUBMITTALS

A. Product Data: Furnish a complete list of fire protection equipment and products, and manufacturer's catalog data sheets and maintenance data sheets for each item to be included in the project.

B. Shop Drawings: Submit drawings which have been prepared in accordance with NFPA 13 identified as "Working Plans," including hydraulic calculations, and which have been approved by the authority having jurisdiction. Submit evidence of final drawing approval by the authority having jurisdiction prior to the start of fabrication or installation.

C. Test Reports and Certificates: Include "Contractor's Material & Test Certificate for Aboveground Piping" and "Contractor's Material & Test Certificate for Underground Piping" as described in NFPA 13, for work provided.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: All above ground fire sprinkler system work shall be performed by a licensed fire sprinkler contractor in the State of Washington holding a Level III Certificate of Competency.

1.6 CODES AND STANDARDS

A. Code Compliance: Comply with most current adopted edition of following:

1. International Building Code (IBC), Standards and Amendments.
2. International Mechanical Code (IMC), Standards and Amendments.
3. International Fire Code (IFC), Standards and Amendments.
4. National Fire Protection Association (NFPA).
5. National Electrical Code (NEC); NFPA 70.
6. Applicable State and local codes, laws and ordinances

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and Equipment: All fire protection system materials and equipment shall be new and current products of a manufacturer regularly engaged in the production of such materials and equipment.

B. Approval Guides: All fire protection system materials and equipment shall be listed in the latest publication of the Underwriter's Laboratories Fire Protection Directory or the Factory Mutual Approval Guide.

2.2 PIPE AND TUBING MATERIALS

A. Pipe or tubing shall be metallic and meet or exceed the standards of NFPA 13.

2.3 PIPE FITTINGS

A. Threaded Fittings: ANSI B16.4, Class 125, rated for 175 psi, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

2.4 HANGERS AND SUPPORTS

A. Provide hangers to support all piping in perfect alignment without sagging or interference, to permit free expansion and contraction, and meet the requirements of NFPA 13.

B. Pipe rings shall be zinc-coated. Grinnell figure 69 or approved equal.

C. Hanger rods to be electro-galvanized.

2.5 SEISMIC BRACING

A. Seismic bracing shall be with a pipe clamp and pipe with swivel type anchor or those similar to illustrations in NFPA 13 Figures A-4-5.4.3.5.1 (e) and (f). Other types of UL listed or FM approved bracing may be used.

2.6 SPRINKLERS

A. Provide automatic sprinklers throughout. Sprinklers in finished ceilings shall be glass bulb type with white finish and white recessed escutcheon unless otherwise noted. Temperature rating of sprinkler shall be as required by application. Extended coverage sprinklers may be used where installed in accordance with NFPA 13 and UL/FM listings.

B. Sprinkler finishes:

1. Recessed pendent: Chrome plate with chrome escutcheon.

C. Provide spare sprinklers and escutcheons for each type and style of sprinkler used in accordance with NFPA 13 and proportioned based upon the number, type and style of sprinklers installed on the project.

PART 3 - EXECUTION

3.1 PIPING INSTALLATIONS

A. Deviations from approved "working plans" for fire sprinkler piping, require approval of the authority having jurisdiction and shall be made only after careful coordination with other Trades on the project and the Architect.

B. Piping shall be so arranged to allow space for other equipment and piping. Coordinate all work with other trades on the job, and where necessary to alter work, it shall be done at no extra charge to the Owner. Install piping to provide maximum head height.

C. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.

D. Hangers and Supports: Comply with requirements of NFPA 13 and NFPA 14. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide required seismic bracing in accordance with NFPA 13.

3.2 SPRINKLER INSTALLATION

A. Use proper tools to prevent damage during installations. Sprinkler head layout in finished ceiling areas shall be symmetrical with all heads in straight lines and evenly spaced with respect to lighting fixtures, etc.

B. Sprinkler heads located in 2'x 2' lay-in type ceiling panel shall be centered in tile unless otherwise indicated. Sprinkler heads located in 2'x 4' lay-in type ceiling panel shall be centered in tile or located at quarter points unless otherwise indicated.

END OF SECTION 15300

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes plumbing fixtures and related components.

1.3 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

1.4 SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

1. Include summary table of plumbing fixtures, in order scheduled, listing fixture identification symbol, fixture and all related trim and accessories with manufacturers and model numbers.
2. Include single product data for accessories (p-traps, stops, supplies, ADA protective shielding guards, etc.) common to multiple fixtures. Identify which fixture symbols each accessory applies to. Do not duplicate product data for common accessories.

B. Maintenance Data: For plumbing fixtures to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements of the International Building Code (IBC) and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

C. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment,"

D. NSF Standard: Comply with NSF 61, "Drinking Water System Components- Heath Effects," for fixture materials that will be in contact with potable water.

E. Water Conservation: Comply with requirements of the Uniform Plumbing Code (UPC) as amended by Washington State Building Code Council (Chapter 51-47 WAC) for maximum water usage by plumbing fixtures.

F. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers, for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Hand Sinks: NSF 2 construction.
2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
3. Vitreous-China Fixtures: ASME A112.19.2M.
4. Water-Closet, Flushometer Tank Trim: ASSE 1037.

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Faucets: ASME A112.18.1M.
2. NSF Materials: NSF 61.
3. Pipe Threads: ASME B1.20.1.
4. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
5. Supply and Drain Fittings: ASME A112.18.1M.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings and accessories:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1M.
   a. Stops: Chrome-plated, quarter-turn ball or compression type; 1/2 inch nominal compression or threaded inlet, loose-key.
   b. Supplies: Chrome-plated; flexible tubing riser with ground joint connection to fixture and wall escutcheon.
3. Manual-Operation Flushometers: ASSE 1037.
4. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
5. Tubular Brass Drainage Fittings and Piping: ASME A112.18.2M; 17 gauge minimum; semi-cast p-traps with cleanout, 1-1/2" minimum.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Hose-Coupling Threads: ASME B1.20.7.
2. Pipe Threads: ASME B1.20.1.
3. Plastic Toilet Seats: ANSI Z124.5.
4. Supply and Drain Piping Protective Shielding Guards: ICC A117.1.
   a. Manufactured, molded anti-microbial protective pipe covers for covering hot and cold water supplies, stops, p-trap and drain piping; flush, snap-in tamper-resistant fasteners; gray color; ADA compliant.

1.6 COORDINATION

A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lavatories, Water Closets:
   a. American Standard, Inc.
   b. Crane Plumbing
   c. Eljer Plumbingware
   d. Kohler Co.
   e. TOTO USA, Inc.
   f. Zurn Industries, Inc.
2. Faucets:
   a. American Standard, Inc.
   b. Bradley Corporation
   c. Central Brass
   d. Chicago Faucet Co.
   e. Crane Plumbing
   f. Delta Commercial Faucets
   g. Eljer Plumbingware
   h. Elkay Mfg. Co.
   i. Geberit
   j. Just Mfg. Co.
   k. Kohler Co.
   l. Leonard Valve Company
   m. Moen, Inc.
   n. Powers Process Controls
   o. Sloan Valve Company
   p. Speakman Company
   q. Symmons Industries, Inc.
   r. T & S Brass and Bronze Works, Inc.
   s. Zurn Industries, Inc.
3. Flushometer Valves:
   a. Geberit
   b. Sloan Valve Company
   c. TOTO USA, Inc.
   d. Zurn Industries, Inc.
4. Water Closet Seats:
   a. Bemis Mfg. Co.
   b. Beneke Corp.
   c. Centoco Mfg. Co.
   d. Church Seats
   e. Olsonite Corp.
   f. Zurn Industries, Inc.

5. Drinking Fountains and Water Coolers:
   a. Elkay Mfg. Co.
   b. Halsey Taylor
   c. Haws Corporation
   d. Oasis Corporation

2.2 PLUMBING FIXTURE SCHEDULE

A. General: Basis of Design manufacturers and model numbers listed are for reference only for level of quality and required features.

B. WFA: Water Closet (Accessible): Floor-mount, bottom outlet, white vitreous china, 1.6 gallon flush, elongated bowl, siphon action or siphon jet with white solid plastic open front seat, bolt caps and flushometer valve.

1. Fixture:
   a. Kohler "Highcliff" #K-4368
2. Flushometer Valve:Sloan Royal II #111

C. LCA: Lavatory (Accessible, Sensor-Operated): Counter-mount, self-rimming, 19-1/4"x16-1/4" oval, white enameled cast iron, single faucet hole, AC powered, sensor-operated, deck-mount mixing faucet complete with vandal resistant cast brass spout, external temperature control, above deck electronics, 1-1/4" outlet chrome plated cast brass grid drain, 1-1/2" p-trap with cleanout and 1-1/2" x 1-1/4" reducing washer, supplies, stops and protective shielding guards as required.

1. Fixture:
   a. Kohler "Farmington" #K-2905-1
2. Faucet:
   a. Chicago Faucet #116.122.21.1

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-hanging fixtures with tubular waste piping attached to supports.

F. Install counter-mounting fixtures in and attached to casework.

G. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

H. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 15 Section "Valves" for general-duty valves.

I. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

J. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

K. Install protective shielding guards on hot and cold water supplies, stops, p-trap and drain piping for fixtures designated as accessible.

L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

N. Install toilet seats on water closets.

O. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

P. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

Q. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

R. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

S. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

T. Install disposer in outlet of sinks indicated to have disposer.

U. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.

V. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.

W. Set bathtubs, shower receptors, and service basins in leveling bed of cement grout. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for grout.

X. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect water supplies from water distribution piping to fixtures.

C. Connect cold water supply piping to plumbed emergency plumbing fixtures without integral, water-tempering system.

D. Connect hot and cold water supply piping to hot and cold tempering equipment. Connect tempered water piping to emergency plumbing fixtures.

E. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary drainage and vent piping.

F. Connect drain piping from fixtures to sanitary drainage and vent piping.

G. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

H. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

I. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets, shower valves, and flushometer valves to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15410

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes metal ducts for supply, return, and exhaust air-distribution systems in pressure classes from minus 2-inch to plus 10-inch wg. Metal ducts include the following:

1. Rectangular ducts and fittings.
2. Single-wall, round, and flat-oval ducts and formed fittings.
3. Duct liner.

B. Related Sections include the following:

1. Division 15 Section "Duct Accessories" for dampers, turning vanes, and flexible ducts.

1.3 QUALITY ASSURANCE

A. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.4 DEFINITIONS

A. NAIMA: North American Insulation Manufacturers Association.

B. SMACNA: Sheet Metal and Air Conditioning Contractors National Association.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Duct liner.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation. Where specifically indicated, ducts shall have "galvaneal" ("paint-grip") finish for surfaces to be painted.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 DUCT LINER

A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.

1. Manufacturers:
   a. CertainTeed Corp.; Insulation Group; "ToughGard2" Duct Liner.
   b. Johns Manville International, Inc.; "Linacoustic RC" Duct Liner.
   c. Johns Manville International, Inc.; "Spiracoustic Plus", "Spiracoustic" Round Duct Liner.
   d. Knauf Fiber Glass GmbH.; "Duct Liner E-M".
   e. Owens Corning.; "QuietR" Duct Liner.
2. Materials: ASTM C 1071; surfaces exposed to airstream shall be coated with tightly bonded non-woven mat to prevent erosion of glass fibers and to facilitate duct cleaning.
   a. Thickness: 1 inch unless otherwise indicated.
   b. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
   c. Anti-Bacterial and Fungal Prevention: EPA-registered anti-microbial agent treatment in airstream surfaces applied to aid in the prevention of fungal and bacterial growth. Comply with ASTM C 1338, ASTM G21, ASTM G22.
   d. Maximum Emissions Levels:
      1) Formaldehyde: 0.05 ppm
      2) Total Volatile Organic Compounds (TOVC): 0.50 mg/m^3
      3) Total Particles: 0.05 mg/m^3
   e. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
   f. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
   g. Mechanical Fasteners: Galvanized steel suitable for welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
      1) Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.
      2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
      3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.3 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

C. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

D. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

F. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

1. Supports for Galvanized Steel Ducts: Galvanized steel shapes and plates.
2. Supports for Stainless Steel Ducts: Stainless steel support materials.
3. Supports for Aluminum Ducts: Aluminum support materials unless materials are electrolytically separated from ducts.

2.5 APPLICATION OF LINER IN RECTANGULAR DUCTS

A. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.

C. Butt transverse joints without gaps and coat joint with adhesive.

D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

F. Apply adhesive coating on longitudinal seams in ducts where air velocities are greater than 2500 fpm.

G. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.

H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

1. Fan discharges.
2. Intervals of lined duct preceding unlined duct.
3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm or where indicated.

I. For double-wall (insulated) ducts, secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

1. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

J. Terminate inner ducts with build outs attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated build outs (metal hat sections), or other build out means are optional; when used, secure build outs to duct walls with bolts, screws, rivets, or welds.

2.6 ROUND DUCT AND FITTING FABRICATION

A. Round, Longitudinal- and Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Duct Joints:

1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 1-inch wg .
2. Exhaust Ducts (Negative Pressure): 1-inch wg.

B. All ducts shall be standard galvanized steel:

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install round and flat-oval ducts in lengths not less than 10 feet unless interrupted by fittings.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, size, and shape and for connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

F. Secure ductwork joints and fittings for materials-handling applications such as clothes dryers and sawdust collection systems with fastening devices that do not extend into the duct and airstream.

G. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

I. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

L. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

M. Cap or seal temporary duct openings during construction. Remove caps or seals for final connections.

N. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

O. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Refer to SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

P. Protect duct interiors from the elements and foreign materials until building is enclosed.

Q. Paint interiors of metal ducts, that do not have duct liner, for 24 inches upstream of registers and grilles where bare sheetmetal is visible from a normal viewer position. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer.

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

1. For pressure classes 2-inch wg and lower, seal transverse joints at a minimum.

B. Seal ducts before external insulation is applied.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 15 Section "Duct Accessories." Locate flexible connectors in sections of ductwork below roof level for roof mounted equipment unless indicated otherwise.

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 15815

SECTION 15820 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Turning vanes.
2. Flexible connectors.
3. Flexible ducts.

B. Related Sections include the following:

1. Division 15 Section "HVAC Instrumentation and Controls" for control dampers and damper actuators.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Flexible connectors.
2. Flexible ducts.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA Standard 500 for maximum leakage rates.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent (1 minimum) of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 TURNING VANES

A. Manufactured Turning Vanes: Single or double-wall vanes of galvanized sheet steel set into vane runners with friction insert tabs on 4 inch centers.

1. Manufacturers:
   a. Ductmate Industries, Inc.
   b. Duro Dyne Corp.

2.4 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 24 gage, galvanized sheet steel.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 20 to plus 200 deg F.

2.5 FLEXIBLE DUCTS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Flexmaster U.S.A., Inc.
3. Hart & Cooley, Inc.
4. McGill AirFlow Corporation.
5. Thermaflex

B. Insulated-Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; 1 inch fibrous-glass insulation; polyethylene vapor barrier film.

1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 175 deg F.

C. Flexible Duct Clamps: Nylon strap, in sizes 3 through 18 inches to suit duct size.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators. In general, make final duct connections with flexible connectors for units without fan internal vibration isolation. Locate flexible connectors below roof level for rooftop equipment unless indicated otherwise.

D. Connect diffusers or light troffer boots to low pressure ducts with maximum 48-inch lengths of flexible duct clamped or strapped in place. Install sheetmetal elbow or flexible elbow at terminal connection to prevent duct crimping.

E. Bends in flexible ducts shall be made with not less than 1 duct diameter centerline radius. Do not compress ducts.

F. Connect flexible ducts to metal ducts with nylon draw straps.

END OF SECTION 15820

SECTION 15838 - POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on actual site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gages and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Maintenance Data: For power ventilators to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. UL Standards: Power ventilators shall comply with UL 705; UL 762 for grease-laden air applications.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.

B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Engineering & Mfg. Corp.
2. Aerovent; a Twin City Fan Company.
3. Bayley Fans.
4. Breidert Air Products, Inc.
5. Broan Mfg. Co., Inc.
6. Carnes Company HVAC.
7. Loren Cook Company.
8. Greenheck.
9. Howden Buffalo, Inc.
10. Madison Manufacturing.
11. PennBarry.
12. Trane Co. (The).

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Grease-Lubricated, self-aligning, pillow-block-type ball or roller bearings with cast-iron housing.
   a. Ball-Bearing Rating Life: ABMA 9, L_{10} of 40,000 hours.
   b. Roller-Bearing Rating Life: ABMA 11, L_{10} of 40,000 hours.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Self-flashing without a cant strip, with mounting flange.
2. Overall Height: 12 inches.

2.3 MOTORS

A. Comply with requirements in Division 15 Section "Motors".

B. Enclosure Type: Guarded dripproof.

2.4 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware.

C. Install units with clearances for service and maintenance.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Equipment Startup Checks:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Verify lubrication for bearings and other moving parts.
6. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
7. Shut unit down and reconnect automatic temperature-control operators.
8. Remove and replace malfunctioning units and retest as specified above

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

END OF SECTION 15838

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, grilles.

B. Related Sections include the following:

1. Division 15 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each product scheduled, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carnes.
2. Krueger.
3. Metal Industries, Inc.
4. Nailor Industries
5. Price Industries.
6. Titus.
7. Tuttle & Bailey.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855

SECTION 15955 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 SCOPE

A. The air distribution systems shall be balanced by an independent testing, adjusting and balancing (TAB) firm or an Engineering firm with a minimum five years experience in HVAC design and balancing. The TAB firm shall furnish the necessary instruments for making tests, perform balancing work, and issue a certified report of balancing work performed. Balancing reports shall be AABC, NEBB certified or shall be certified by a Registered Professional Mechanical Engineer registered in the State where the project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. TAB work shall not be started until such time as the following conditions are completely fulfilled:

1. Systems shall be completely installed and shall have been successfully test run, and fully operational.
2. Outlets, dampers, balancing devices, and accessories shall be completely installed.
3. Filters shall be clean.

3.2 INSTRUMENTS

A. Instruments used for TAB measurements shall be accurate and calibration histories for each instrument shall be available for examination.

3.3 PROCEDURES FOR AIR SYSTEMS

A. TAB for air systems shall include the following:

1. Set supply fans at design speeds and record average amperage readings on all fan motor phases, static pressures and cfm of air flow in each system.
2. Read air flows at diffusers and grilles with a flow hood or equal air measuring device. Adjust dampers as required.
3. Adjust outside air dampers to scheduled minimum cfm.
4. Adjust fans as required to meet design airflows.
5. Check for drafts, noise and vibration.
6. After balancing is complete, mark final position of balancing dampers.
7. Report any discrepancies.

3.4 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: +/- 10 percent.

2. Air Outlets and Inlets: +/- 10 percent
3. Heating-Water Flow Rate: +/- 10 percent
4. Cooling-Water Flow Rate: +/- 10 percent

3.5 REPORTS

A. Submit, on neat and legible forms, the full, certified report of systems operation, initial and final readings.

B. Upon completion of TAB of air and/or hydronic systems, prepare a complete and legible preliminary report. Submit 2 copies for review.

C. Upon verification and approval of the preliminary report, prepare final certified report. Furnish one copy to the Architect, and the remaining 3 copies are to be included in the Owner's Operation and Maintenance Manuals.

END OF SECTION 15955

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DIVISION 16 - ELECTRICAL

Section	16050	Basic Methods and Requirements (Electrical)
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	16510	Building Lighting, Interior
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SECTION 16050 - BASIC METHODS AND REQUIREMENTS (ELECTRICAL)

PART 1 - GENERAL

1.1 DESCRIPTION

A. SCOPE OF WORK is not limited to but includes the following,
- Panelboard and circuit breakers.
- Electrical devices.
- Demolition and removal of abandoned circuits, devices, boxes, and equipment.
- Lighting.
- Alert button alarm system.
- Fire alarm devices.
- All conduits and boxes shall be recessed into new walls.

B. Ampacity specified or shown on the drawings, are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.

C. All materials not specifically called out, but required to provide a complete and operable electrical installation in accordance with the intent of the drawings and specifications, shall be supplied as part of the bid price.

D. The work on this project is on an existing building which will remain occupied and in use while the construction is being performed. Work must be accomplished so that all services remain in operation and on going operations are not hindered. Project is to be performed in phases as described in the contract documents. Contractor shall accomplish work in accordance with phased sequence. Contractor shall perform his work in a sequence that will prevent interruptions of the existing facility.

1.2 MINIMUM REQUIREMENTS

A. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) are the minimum standard for installation.

B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in NEC.

1.3 TEST STANDARDS

A. All material 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 material 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; 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 ten 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 at least one year.
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. Service organization shall have a service office within 200 miles of the job site.

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 should 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 reinspection 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, GENERAL CONDITIONS and Section 01340, SAMPLES AND SHOP DRAWINGS, 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.

B. Unless noted in other sections of this specification, enclosures for electrical equipment shall be as follows:

NEMA 1	All indoor locations
NEMA 3R	All outdoor, damp or wet locations

1.7 EQUIPMENT PROTECTION

Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain.

A. 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, operating and painting.

B. 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.

C. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.

D. 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. Arrange, phase and perform work to assure electrical service for other buildings at all times.

B. 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.

C. When bidding work on an existing installation, Contractor shall visit the job site, verify all dimensions, compare the site with the drawings and specification, and check the location of existing structures or equipment which may affect the installation. By the act of submitting a bid, the Contractor shall be deemed to have examined the site and all structural,

architectural, mechanical, and electrical drawings and to have accepted existing conditions and included allowances for them in the bid price.

D. Due to structural conditions, mechanical duct or piping interference, retained existing facilities or for other reasons, the Contractor may desire to install the work in a manner different from that shown. Such changes shall be presented to the Resident Engineer for approval before proceeding, and the record drawings shall be accurately revised to show the changes as completed.

E. No structural member of building shall be cut or notched without specific approval of the Resident Engineer. Surfaces shall be neatly restored to original condition when cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces has been required for installation, support, or anchorage or conduit, raceways, or other electrical materials and equipment.

F. Contractor shall perform all cutting, drilling, and patching that is necessary to properly accomplish his work. All patching shall be done with materials equal in quality and durability to the existing finish. The finish on patched work shall match the finish on the existing surface or wall. Any questions on the acceptability of a particular finish shall be referred to the Resident Engineer.

G. Contractor shall field verify all dimensions and verify all equipment can be installed as shown on the drawings. Prior to ordering equipment, Obtain from the Resident Engineer, resolution on any problems or discrepancies.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. The size and configuration of mechanical, electrical and building equipment varies with manufacturer and model number. It is the responsibility of the Contractor arrange equipment so that clearances relative to the electrical equipment are in accordance with NEC.

C. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed by the Resident Engineer.

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 motors, pumps, belt guards, transformers, piping, and duct work. If there is a question regarding

suitability of equipment location then, prior to installation, contact the Resident Engineer for resolution.

D. Because exact data on equipment of various manufacturers are not known at the time of design, actual equipment models, ratings and configuration may be different than those used in developing the design. Contractor shall make any necessary changes to accommodate the equipment being installed; this includes changes to the electrical equipment or materials and addition of circuits and wiring.. Cost for making these changes or additions shall be included in the bid price.

E. Materials and equipment shall be installed in accordance with the manufacturer's instructions and codes and regulations. A copy of the manufacturer's installation instructions shall be kept on the job-site; available for review at all times. Wherever any conflict arises between manufacturer's instructions, codes and regulations, and these contract documents, the Contractor shall notify the Resident Engineer and collaborate on a solution.

1.10 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, 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. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.11 SUBSTITUTION OF EQUIPMENT AND MATERIALS

A. In order to establish a basis of quality, some equipment is specified by manufacturer's name, brand, or catalog number. It is not the intent of these specifications to exclude other brands of equipment that are an acceptable substitute for those specified. All materials and equipment substitutions are subject to final review for compliance with the specifications during the construction period submittal review process and shall measure up to the standards of those specified.

B. It is the responsibility of the Contractor to verify that substituted material and equipment meet the requirements of the specifications and drawings and are equal to the specified product.

C. The Contractor shall be responsible for checking that substitute equipment meets the specification and will work compatibly with the existing design and will fit the spaces allowed. The cost of any redesigning and rework as a result of a substitution shall be the responsibility of the Contractor.

1.12 SUBMITTALS

A. Submit in accordance with section 01340, SAMPLES AND SHOP DRAWINGS.

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. Submittals on equipment and material shall include: catalog sheets, specification sheets, wiring and connection diagrams, layout and dimensions, descriptive material, performance data, operation description and any other data required to show compliance with contract documents. Other specific submittal requirements are noted within the individual sections. 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_____".
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. 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.

3. 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: Submitted in accordance with Section 01010, GENERAL REQUIREMENTS.

1. Maintenance and Operation Manual, 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 manual shall include:
   a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
   b. Description of the function of each principal item of equipment.
   c. Installation and maintenance instructions.
   d. Safety precautions.
   e. Diagrams and illustrations.
   f. Testing methods.
   g. Performance data.
   h. 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. Engineer's review is for general conformance with the project's design concept and contract documents. The Contractor is solely responsible for correctness of details, ratings, dimensions, quantities, catalog numbers and for determining techniques of

construction. The submittal review does not release the Contractor from compliance with requirements of the contract documents. Changes to the contract documents must be formally identified in writing on a separate letter and not be hidden in the body of the submittal.

1.13 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 DRAWINGS

A. The plans are diagrammatic and are only intended to show general location and configuration of the equipment. Specific layout, mounting of equipment and electrical connections shall be determined by the Contractor to conform with intent of contract documents and meet the NEC. Proposed modifications of these plans and specifications shall be requested in writing to the Resident Engineer. The request shall be made as soon as practicable and within 30 days after contract award, stating the reasons for the modification.

B. Any errors, inconsistencies or discrepancies in the drawings or specifications shall be reported to the Resident Engineer in writing prior to the bid date.

C. Contractor shall make a complete marked up record set of blueline drawings showing all changes or modifications from the original drawings and specifications. These drawings shall show as-built conditions which include raceway and wiring layout, location and size of equipment, panelboard layout and any other changes which deviate from the original drawings. The as-built set of drawings shall be submitted to the Resident/Engineer at completion of the project.

D. Riser, block, wiring and other diagrams are schematic only and do not show the physical arrangement or actual wiring of the equipment. Contractor shall configure circuits and wiring as necessary to accommodate actual system or equipment being installed. These diagrams shall not be used to obtain quantities or lineal footage for circuits.

E. The drawings show the required size, number and type of wires and points of termination of the conduits, but do not always show the routing or number of conduits and raceways.

Additional conduits, wiring and materials shall be provided by the Contractor wherever needed to complete the installation and make operational the specific equipment furnished.

1.16 WARRANTY

A. All work and equipment shall be free of defects in accordance with the warranty period as defined in the General Conditions unless otherwise noted in this specification. Any defects arising within the warranty period shall be replaced or repaired by the Contractor as part of the bid amount.

1.17 TESTS

A. Testing described below shall be in addition to any other tests required under the specific sections of this specification.

B. After completion of the work and adjustments to the equipment. All equipment and systems shall be tested to demonstrate that they function in accordance with the intent of the specifications, drawings and manufacturer's instructions.

C. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects. All circuits shall be tested for proper neutral connections.

D. If a problem occurs with the electrical system prior to substantial completion or any time during the warranty period, then it is the responsibility of the Contractor to provide personnel and any test equipment needed to identify the cause of the problem.

1.18 DEMOLITION

A. Contractor shall remove all raceways, wires, devices, fixtures, and equipment that are being abandoned as a result of the project work. All abandoned materials shall be removed from the job site. Contractor shall visit the job site to assess the extent of work required and shall include the cost of this work in the bid price. Demolition work not specifically identified, but required for performance of the project shall be accomplished by the Contractor as part of the bid amount. The Contractor shall replace all devices, equipment and wiring that have been demolished where the Resident Engineer has determined the intent was for them to remain.

B. All abandoned circuits shall have raceways and wires removed back to the source connection. All existing raceways being abandoned and located in accessible locations, shall be removed, this includes attics and ceiling spaces. Existing raceways exposed

during construction and being abandoned shall be removed. In unfinished areas, abandoned, below ground raceways shall be cut back to stub up at floor level, capped and left in place. In finished areas abandoned conduits routed in the slab or under the floor slab shall be cut back and filled in and made flush with surrounding floor.

C. Existing recessed and surface mounted outlets and boxes being abandoned shall be removed along with the associated conduit. The holes in the walls shall then be patched and painted to match the surrounding surfaces.

D. Where the Contractor must cut into the existing structures in order to remove existing material or install new material, then the Contractor shall patch and finish the surfaces so as to match the finish on the existing surfaces.

E. If existing circuits, equipment or devices to remain are disconnected or need to be relocated as a result of the project work or demolition, then Contractor shall provide new conduit, wiring, and devices as necessary to install the device, outlet or equipment that was relocated or disconnected.

F. Contractor shall replace existing ceiling tiles, building components and equipment which are damaged during construction. Any repairs shall be accomplished to the satisfaction of the Resident Engineer.

G. All existing boxes and associated conduits which are being abandoned shall be removed and the hole patched and finished to match the surrounding surfaces. This includes, single gang and multi-gang boxes, cabinets and equipment boxes, pull boxes and junction boxes.

1.19 WORK ON EXISTING BUILDINGS

A. The work of this project includes alterations of an existing building to achieve the arrangement indicated on the drawings. The Contractor shall include in his bid an allowance sufficient to cover the costs of removing, relocating and rewiring all electrical devices, boxes, conduit and other items necessary to accomplish the work in accordance with the intent of the Contract Documents. Provide continuing electrical service for those existing portions of the project which are to remain in operation.
Provide temporary wiring to maintain existing systems in service during construction.

B. Existing outlets, devices, fixtures and equipment not part of the alteration are intended to remain in service unless otherwise noted.

C. Outlets and devices shown on the drawings represent the arrangement at completion of work. Contractor shall add and remove outlets and devices to achieve the final arrangement.

D. The Contractor shall not interrupt the continuity of electrical power to the existing facilities unless it is coordinated with the Resident Engineer.

E. In Finished Areas: New devices, boxes and equipment shall be mounted recessed into the existing walls and ceilings. New conduits shall be hidden by recessing into existing walls, ceilings and crawl space. Walls in the various areas are gypsum, ceramic tile, cinder block, and plaster over lath. Ceilings in the various areas are suspended tile, gypsum, and acoustical tile. Some ceilings have a crawl space others are directly mounted to ceiling structure without crawl space. Existing walls shall be modified as necessary to accommodate the addition of the new devices and equipment. Walls shall then be patched and finished to match the surrounding area. Surface raceways are not allowed unless shown on drawings or approved by the Resident Engineer.

F. The alteration of the existing building is work of a complete nature which will require accurate planning, careful preparation and execution, attention to detail, and close supervision by the Contractor. He will be required to do this work in full cooperation with the other construction trades and subject to scheduling arranged to minimize disruption of the normal activities of the facility.

---END---

SECTION 16111 - CONDUIT SYSTEMS

PART 1 -GENERAL

1.1 This section specifies raceways, conduits, boxes, fittings, and supports for the installation. The listing of particular equipment and materials shall not be construed as being all the material and equipment required to complete the work. Materials not specifically identified, but required for a complete installation, shall be provided by the Contractor.

1.2 RELATED WORK

A. Sealing around penetrations to maintain the integrity of time rated construction: Section 07920, SEALANTS AND CAULKING.

B. Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building: Section 07920, SEALANTS AND CAULKING.

C. Identification and painting of conduit and other devices: Section 09900, PAINTING.

1.3 SUBMITTALS

Contractor to provide catalog and specification sheets on the following:

- Conduits, raceways, boxes, associated components, fittings

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.

PART 2 - CODES AND STANDARDS

The current edition of the following standards, codes and specifications including documents referenced therein, form a part of this specification.

Federal Specifications (Fed. Spec.):

W-C-582A	Conduit, Raceway, Metal, And Fittings; Surface
W-C-586C	Conduit Outlet Boxes, Bodies, And Entrance Caps, Electrical; Cast Metal
W-F-406C	Fittings For Cable, Power, Electrical And Conduit, Metal, Flexible
W-F-408D	Fittings For Conduit, Metal, Rigid (EMT) Type)
W-J-800E	Junction Box; Extension Junction Box; Cover Junction Box (Steel, Cadmium, Or Zinc-coated)
FF-S-760A(2)	Strap, Retaining (Metal For Conduit, Pipe, And Cable)

WW-C-00540C	Conduit, Metal, Rigid; and Coupling, Elbow And Nipple, INT AMD 1
	Electrical Conduit, Aluminum
WW-C-566C	Conduit, Metal, Flexible
ANSI C80.1	Rigid Steel Conduit, Zinc Coated
UL 1	Flexible Metal Conduit
UL 5	Surface Metal Electrical Raceway And Fittings
UL 6	Rigid Metal Conduit
UL 50	Electrical Cabinets And Boxes
UL 360	Liquid Tight Flexible Steel Conduit
UL 467	Electrical Grounding And Bonding Equipment
UL 514B	Fittings for Conduits and Outlet Boxes
UL 797	Electrical Metallic Tubing
NEMA FB-1	Fittings and Supports for Conduit and Cable Assemblies

PART 3 - PRODUCTS

3.1 Galvanized rigid steel (GRS) conduit shall have threaded ends with a hot dipped galvanized finish. Couplings shall be unsplit NPT threaded steel cylinders with galvanizing equal to the conduit. Nipples shall be factory made through 8 inch lengths. Running threads will not be allowed. Locknuts shall be galvanized steel through size 2-inches. Locknuts larger than 2 inches shall be malleable iron. Locking nust shall be bonding type with sharp edges for digging into the metal wall of an enclosure. Conduit bushings shall be malleable iron with insulating collar. Grounding bushings shall be locking type and provided with a feed-through compression lug for securing the ground conductors. Unions shall be malleable iron type Appleton UNF or UNY. Threadless fittings and connections on GRS conduit are not acceptable.

3.2 Liquid tight flexible metal conduit shall be manufactured with galvanized steel convolutions, covered by a liquidtight PVC layer, and have the manufacturer's marking at three foot intervals. Connectors shall be UL approved for grounding and employ a ferrule which covers the end of the conduit inside and out. Conduit shall be installed with a grounding wire for all installations; flexible metal conduit shall not be relied upon as the ground return path. Conduit shall be Flexguard by O.Z. Gedney and connectors shall be malleable iron type 4Q-L Ground-Tite by O.Z. Gedney.

3.4 Electrical metallic tubing (EMT) shall be the same inside diameter as rigid steel conduit. All conduit shall be galvanized and each length shall be UL labeled. Couplings and connectors shall be gland compression type pressure cast or steel set screw fittings: Appleton or substitute. Fittings using indentations will not be permitted. At all box connections, provide insulated bushing or insulated throat connector.

3.5 Surface metal raceways shall be installed indoors only and located where noted on the drawings. Provide Wiremold or equal; minimum size, No. 500. All raceways and associated fittings shall be ivory finish applied by the manufacturer of the raceway; buff colored raceways are not be acceptable.

3.6 Flexible metallic tubing shall be formed from spiral wound galvanized steel strip with successive convolutions securely interlocked and each length to be marked with the UL label. Minimum size shall be 1/2 inch. Connections to boxes and EMT shall be made with standard couplings approved for the application: O.Z. Gedney or equal.

3.8 Expansion coupling on embedded conduit shall be watertight and provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for 3/4-inch movement in any direction.

3.9 Conduit bodies, outlet boxes and junction boxes for connection to GRS shall be malleable iron or cast aluminum with threaded hubs for conduit terminations. Conduit body hubs to have integral bushings with tapered threads. Covers to be steel with stainless steel screws and neoprene gaskets.

3.11 Boxes when not designated shall be as follows for a particular area:

NEMA 1	For use in dry indoor locations
NEMA 3R	For use outdoors and wet locations

3.12 Outlet, junction, and device boxes in wiring system shall be provided to suit conditions encountered and shall be metal unless otherwise indicated or approved. Boxes shall not be less than 1-1/2 inches deep, unless shallower boxes are required by structural conditions and are specifically approved by the Resident Engineer.

Indoor outlet, junction, and device boxes shall be standard 14 gauge galvanized pressed steel. All unused knockouts shall be left sealed. Minimum box size shall be 4-inch square, except that smaller boxes may be used when required by the particular fixture to be installed or due to space limitation. Boxes installed in plaster or gypsum walls shall have a plaster ring. Covers to be

installed on all boxes. Outlet boxes installed in concrete block walls shall have 1-1/2 inch square covered tile extension.

Outdoor and wet location boxes shall be gasketed cast metal type.

3.14 Conduit supports shall be galvanized Unistrut when used to support groups of conduits. Individual GRS conduit supports shall be one-hole galvanized malleable iron pipe straps used with clamp backs and nesting backs. Individual EMT conduit supports shall be one hole or two hole galvanized pipe straps.

3.15 Concentric ring knockouts will not be permitted for conduit entrances to NEMA rated boxes.

3.16 Fire stopping sealant shall have been tested by UL in accordance with ASTM E 119 and listed in the UL Building Materials Directory. Type of sealant and method of installation shall be the appropriate type for the application and in accordance with details supplied by the manufacturer.

3.17 Seal fittings: Threaded cast iron type. Use continuous drain type seal fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank coverplates having the same finishes as that of other electrical plates in the room.

PART 4 - EXECUTION

4.1 Unless otherwise noted conduits shall be installed in locations as specified in the table below:

Conduit Type	Location
GRS	All exterior above ground exposed locations.
EMT	Interior locations and under walkways
Liquidtight Flexible Metallic Conduit	Final raceway connections to all equipment installed outdoors, which require flexibility.
Flexible Metal Conduit	Final raceway connections to all equipment installed indoors which require flexibility. Use with EMT conduit.

Metallic surface raceway shall only be used where noted on the drawings.

Minimum size of conduit shall be,

GRS Above Ground	3/4 inch
EMT indoors	1/2 inch

4.2 Raceways shall run hidden. Raceways installed in mechanical rooms, electrical rooms and other similar spaces may be routed exposed; verify with Resident Engineer. Raceways shall be installed in lines parallel to the building or structural member lines. The installation shall not result

in crossovers or offsets that can be avoided by installing the raceway in a different sequence or a uniform line. The contractor shall limit the number of directional changes of the conduit to total not more than 360 degrees in any run between pullboxes. Conduit runs shall be limited to 400 feet less 75 feet for every 90 degrees of change in direction. Conduits penetrating exterior walls shall be sealed with material to make a waterproof barrier.

4.3 When existing receptacles and switches in flush mounted boxes are to be provided with new wires, they shall be routed hidden behind the wall along the same path as existing wiring. Surface raceways shall not be used for routing wires to existing device boxes unless approved by Resident Engineer.

4.4 Conduit terminations of NEMA type boxes and enclosures shall be provided with double locknuts and insulating bushings or grounding bushings as required by the NEC. Watertight threaded hubs shall be used on all boxes located outdoors or in wet locations. Surface mounted cast boxes shall have threaded hubs.

4.5 Boxes and enclosures which are wall mounted shall be attached by a minimum of three devices. Where enclosures are mounted on wet walls (outdoors, below grade, etc.) provide neoprene or plastic shim washers so that box is a minimum of 1/4 inch off wall surface.

4.6 Attachment to building surfaces and structural members shall be as follows:

Wood	Lag screws, self tapping screws
Masonry and Concrete	Concrete inserts
	Power set fasteners
	Steel expansion anchors
Metal studs	Sheet metal screws
Structural Steel	Clamp, bolt, or weld
Hollow Gypsum Partitions	Molly or toggle bolts
Hollow Tile Over Concrete	Self-drilling anchors with extension rods

4.7 Conduit shall not be routed exposed along the outside surface of the building or any finished interior location unless approved by the Resident Engineer.

4.8 For conduits one inch and larger, hickey bends will not be acceptable; either manufactured elbows or bends fabricated in a bending machine shall be used.

4.9 Support individual EMT conduits by one hole or two hole conduit clamps. Brackets and strap hangers shall be fastened with wood screws on wood, toggle bolts on hollow masonry walls. Nails

shall not be used to fasten conduits or supports. Wire shall not be used in lieu of straps or brackets. Individual GRS shall be supported using malleable iron straps with nesting backs. Where more than three conduits are run in parallel, they shall be supported using Unistrut channel or equal. Conduit racks hanging from the ceiling shall be supported with galvanized carbon steel rod hangers.

4.10 All outlet boxes shall be adequately supported to carry weight of any fixture connected to it. Outlet boxes in the same wall mounted back-to-back are prohibited. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 100 mm (four inches) square by 55 mm (2-1/8 inches) deep, with device covers for the wall material and thickness involved.

4.11 Pullboxes and junction boxes shall be installed for pulling cable where required by the drawings or as determined by the Contractor to facilitate installation of conductors.

4.12 Where conduits only are shown or specified, pull strings shall be installed, then ends sealed with plastic plugs to prevent intrusion of foreign materials. These conduits are either spare, for future use or for use by others.

4.13 Paint exposed conduit as specified in the section on PAINTING.

4.14 EXPANSION JOINTS

Equip conduits three inches and larger, that are rigidly secured to the building structure on opposite sides of a building expansion joint, with expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

Provide conduits smaller than three inches with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. 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 three inches and larger conduits are acceptable.

4.15 INSTALLATION INTO EXISTING WALLS OR CEILINGS

Outlets and devices shown on existing walls shall be recessed into the wall and supplied wiring by fishing conduit down wall to the outlet box. Where fire blocking is encountered then the wall shall be cut open and the fire blocking notched so that conduit can be routed past the blocking. Wall shall then be patched to match the existing surface.

4.16 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 sealant that provides an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.

4.17 Essential (Emergency) circuits shall be installed in raceways entirely independent of other raceway systems.

--------- END ---------

SECTION 16127 - CABLES, LOW VOLTAGE (600V AND BELOW)

PART 1 - GENERAL

1.1 This section specifies wires and cables.

1.2 SUBMITTALS

Provide catalog sheets and specifications on the following:

- 600V Wire and Cables
- Splicing kit for waterproof splices and junction points

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.

2. CODES AND STANDARDS

The current edition of the following standards, codes and specifications, including documents referenced therein, form a part of this specification.

UL 83	Thermoplastic Insulated Wire and Cable
UL 44	Rubber Insulated Wire and Cables
NEMA WC5	Thermoplastic Insulated Wire and Cable for Distribution of Electrical Energy

PART 3 - PRODUCTS

3.1 Conductors and cables shall be identified on the overall jacket with the manufacturer's name, conductor size, number of conductors, type of insulation, type of jacket, and voltage rating. Information shall be printed every 24 inches.

3.2 All conductors shall be copper with the type of insulation specified. Conductors, including insulation, cabling, jacket, filler, shielding, and covering and testing shall meet all requirements of IPCEA, NEC, AND UL. Conductor size shall be not less than that required by NEC.

3.3 Insulated 600V conductors shall be UL listed, rated and comply with NEC table 310-13. They shall be as follows.

A. Branch circuits shall be class B stranded copper conductor with type THWN/THHN insulation. Dual rated at 90 degrees C in wet and dry locations.

B. Wire sizes #12 and #10 may be solid conductors.

C. Connectors for splicing copper in dry locations shall be "Scotchlok" insulated spring connectors.

3.4 All 600 volt conductors used in power circuits shall be color coded in accordance with the following:

Three phase 208Y/120V	Phase A	Black
power. Wires from a	Phase B	Red
3 phase panelboard	Phase C	Blue
	Neutral	White
	Ground	Bare or Green

When connecting new wiring into existing wiring panels use the same color code as the existing installation.

Conductor sizes #12 - #4 shall be color coded the entire length of the conductor. For sizes above #4, conductor ends may be marked with colored tape. Maintain phase color coding for all circuits for the complete wire installation up to the equipment connection. Minimum size of all 600 volt power wiring to be No. 12 and control wiring to be No. 14 unless otherwise noted.

3.5 Ground wire shall be insulated copper conductor.
A copper ground conductor shall be installed in all raceways and used as the grounding means for all equipment.

3.6 Wire Pulling compound shall be Polywater J by American Polywater Corp.
Plastic insulating tape shall be Scotch 33T by 3M.
Conduit protection tape shall be Scotchard No. 50 by 3M.
Insulating putty shall be Scotch-fill by 3M.
Duct sealing compound Shall be Duct-Seal by Porcelain Products Co.

3.7 COMMUNICATION AND SIGNAL WIRING

A. Shall conform to the recommendations of the manufacturers of the communication and signal systems.

B. Wiring shown is diagrammatic only. Provide wiring as required for the systems being provided.

C. Multi-conductor cables shall have the conductors color coded.

PART 4 - EXECUTION

4.1 All power conductors shall be installed continuous with no splices. The contractor shall be responsible for determining the actual length required to make an installation without splices. Pullboxes shall be used to keep pulling tension within allowable limits specified by manufacturers. Use wire pulling compound for installing conductors in conduit to limit the tension. Prior to installing conductors, all raceways shall be complete and protected from weather; conduit runs shall be cleaned and swabbed. If insulation is damaged conductor shall be replaced.

4.3 At least 6 inches of slack conductor shall be left at each outlet or junction box and 9 inches of conductor at each unconnected outlet. Tape free ends of unused conductors and coil neatly in outlet box.

4.4 Conductors shall be terminated with one-piece tool applied compression type connectors; tin plated high conductivity copper. Connectors for wire size No. 10 and smaller shall be ring tongue or locking spade. All connectors shall be approved for the voltage at which it is applied and UL listed.

4.5 Except for lighting and general purpose power conductors, splices will be permitted only where shown on the drawings, or when approved by the Resident Engineer. All splices shall be made in accessible cabinets, boxes or outlets. No splices will be allowed inside conduits. Use plastic insulating tape for all uninsulated splices and taps on circuits up to 600 volts. Apply the insulating tape to a thickness at least equal to that of conductor insulation. Where a bolted splice or connection presents an irregular surface, apply insulating putty to the joints before taping.

4.6 General purpose junction points for lighting and receptacles may be accomplished by means of wire nuts. Wire nuts are not acceptable for below ground and wet locations. Splices and junction points below ground and in wet areas are to be made waterproof by an approved splicing kit.

4.7 Contractor shall not exceed the maximum pulling tension and bend radius on conductors as recommended by the conductor manufacturer.

4.8 All wire connectors, termination points and lugs must be temperature rated for 75 degrees C. This applies to all equipment requiring electrical connections.

4.9 All signal cables not installed in conduit shall be supported and fastened every 3 ft.

4.10 At point where conduits enter a building, seal cable and wire in the conduit with a non-hardening approved compound. Use approved fitting at point of entrance where conduit is then routed through the building.

4.11 CONTROL, COMMUNICATION AND SIGNAL WIRING INSTALLATION

A. Unless otherwise specified in other sections of these specifications, install wiring and connect to perform the functions shown and specified in other sections of these specifications.

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 power supply circuits are not shown for systems, connect them 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 not exceed 120 volts and shall be lower voltages where shown on the drawings or required by the NEC.

4.12 CONTROL, COMMUNICATION 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.

5. TESTING

5.1 All 600 volt conductors shall have a insulation resistance test using a 1000 volt megger. Final insulation resistance of each conductor shall be 5 megohm or greater; conductors which fail the test shall be replaced. Disconnect all devices not capable of withstanding the voltage or current of the megger test.

5.2 Perform continuity test of each conductor from terminal to terminal and phase identification check of power conductors and check continuity of the grounding system.

5.3 Suitable records shall be kept of all tests, indicating the "Megger" readings, continuity test, and conductor identification markings. A duplicate record of all tests shall be furnished to the Resident Engineer.

5.4 The Contractor shall furnish all instruments and personnel required for these tests.

-------- END --------

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes the furnishing, installation, and connection of wiring devices.

1.2 RELATED WORK

A. Section 16050, BASIC METHODS AND REQUIREMENTS (ELECTRICAL).

B. Section 16111, CONDUITS SYSTEMS.

C. Section 16127, CABLES, LOW VOLTAGE (600 VOLTS AND BELOW).

D. Section 16450, GROUNDING.

1.3 SUBMITTALS

In accordance with section 01340, SAMPLES AND SHOP DRAWINGS, furnish the following:

A. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting, material, grade, and termination.

B. Manuals: Prior to final inspection, deliver four copies of the following to the Resident Engineer.

1. Technical data sheets, and information for ordering replacement units.

C Certifications: Prior to final inspection, deliver to the Resident Engineer four copies of the following:

1. Certification by the Contractor that the devices comply with the drawings and specifications, and have been properly installed, aligned, and tested.

1.4 APPLICABLE PUBLICATIONS

The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

A. National Fire Protection Association (NFPA):

No. 70.....National Electrical Code (NEC)

B. Underwriter's Laboratories, Inc. (UL):

5.....Raceways and Fittings, Electrical Surface Metal

20.....General-Use Snap Switches

231.....Power Outlets, Electrical

467.....Grounding and Bonding Equipment, Electrical

498.....Attachment Plugs and Receptacles, Electrical

514.....Outlet Boxes and Fittings, Electrical

943.....Ground Fault Circuit Interrupters

1010.....Receptacle - Plug Combinations, Electrical, For Use In

C. National Electrical Manufacturers Association (NEMA):

WD 1.....General Purpose Wiring Devices

WD 3.....A/C General-Use Snap Switches

WD 5.....Specific-Purpose Wiring Devices

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. General: All receptacles shall be listed by Underwriters Laboratories, Inc., UL in their respective categories). All receptacles in patient areas shall be hospital grade receptacle and all receptacles on the emergency system to be red colored devices.

1. Mounting screws, mounting strap and terminal screws shall be brass or a copper alloy metal.
2. Receptacles shall have provisions for back wiring from four (min.) separate wiring holes and side wiring from four captively held binding screws.

B. Duplex receptacles shall be single phase, 20 ampere, 120 volts, 2-pole, 3-wire, NEMA 5-20R. The duplex type shall have break-off feature for two circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.

1. Bodies shall be Ivory in color.
2. Duplex Receptacles with Ground Fault Interrupter: Shall be an integral unit suitable for mounting in a standard outlet box.
   a. Ground fault interrupter, shall consist of solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20 ampere branch circuit. Device shall have nominal sensitivity to ground leakage current of five milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th of a second.

C. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring hinged flap. The weatherproof integrity shall not be affected when heavy duty specification grade attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.

2.2 TOGGLE SWITCHES

A. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. The rocker type is not acceptable and will not be approved. Switches controlling lights on emergency system to be red colored devices.

1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general use with an integral mounting strap with provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
2. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meeting the requirements of NEMA WD1 Heavy-Duty.
3. Ratings:
   a. 120 volt circuits: 20 ampere at 125 volts AC.
4. The switches shall be mounted on the striker plate side of doors.
5. Incorporate barriers between switches with multigang outlet boxes where required by the NEC.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates will not be acceptable.

B. Standard NEMA design, so that products of different manufacturers will be interchangeable.

C. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.

D. Telephone outlets shall be type 302 stainless steel. Oversize plates will not be acceptable.

E. All wall plates for receptacles and switches to be labeled with panel and circuit number designation from which they are feed from. Labels to per VA requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, and as shown as on the drawings.

---END---

SECTION 16450 - GROUNDING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies general grounding and bonding requirements of electrical installations.

1.2 RELATED WORK

A. General electrical requirements that are common to more than one section in DIVISION 16 Section 16050, BASIC METHODS AND REQUIREMENTS (ELECTRICAL).

1.3 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

A. National Fire Protection Association (NFPA):

70-87.....National Electrical Code (NEC)

No. 99-87.....Health Care Facilities

B. Underwriters Laboratories, Inc. (UL):

83-83 .....Thermoplastic-Insulated Wires and Cables - 8/14/85

467-84.....Grounding and Bonding Equipment - 4/30/85

PART 2 - PRODUCTS

2.1 GROUNDING WIRES

A. General Purpose: UL and NEC approved types, copper, with XHHW or dual rated THHN-THWN insulation color identified green.

B. Size wire not less than what is shown and not less than required by the NEC.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERALLY

A. Ground in accordance with the NEC and as hereinafter specified. Provide grounding wire as the means for grounding.

B. Equipment Grounding:

1. Metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits

shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents.

C. Conduit Systems:

1. Ground all metallic conduit systems.
2. Non-metallic conduit systems shall contain a grounding wire.
3. Conduit provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the conduit.

D. Feeders and Branch Circuits: Provide green grounding wire with feeders and branch circuits

E. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass. (except for special grounding systems for intensive care units and other critical units shown)
2. Provide lugs in each box and enclosure for ground wire termination.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the ground wires.

F. Receptacles are not approved for grounding through their mounting screws. Ground with a ground wire from green ground terminal on the receptacle to the outlet box ground screw.

G. Ground lighting fixtures to the green grounding conductor of the wiring system. Bond fixtures to the conduit system. Fixtures connected with flexible conduit shall have a green grounding wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

H. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green grounding wire.

3.2 GROUND RESISTANCE

A. Grounding system ground resistance shall not exceed 5 ohms. Final tests shall assure that this requirement is met.

---END---

SECTION 16510 - BUILDING LIGHTING, INTERIOR

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes the furnishings, installation of and connection of the interior lighting.

1.2 RELATED WORK

A. Section 16050, BASIC METHODS AND REQUIREMENTS (ELECTRICAL).

B. Section 16127, CABLES, LOW VOLTAGE (600 VOLTS AND BELOW).

C. Section 16450, GROUNDING.

1.3 SUBMITTALS

In accordance with section 01340, SAMPLES AND SHOP DRAWINGS, furnish the following:

A. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting, material, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, lenses, louvers, lamps, and controls.
3. When catalog data and/or shop drawings for fluorescent fixtures are submitted for approval, photometric data from an independent testing laboratory shall be included with the submittal, indicating average brightness and efficiency of the fixture and coefficient of utilization tables.

B. Manuals:

1. Complete operating and maintenance manuals shall be provided, including technical data sheets, and information for ordering replacement parts. Deliver four copies of the above data to the Resident Engineer prior to final inspection.

C. Certifications: Prior to final inspection, deliver to the Resident Engineer four copies of the following certifications:

1. Certification that the equipment has been properly installed, adjusted, and tested.

1.4 APPLICABLE PUBLICATIONS

The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

A. Federal Specifications (Fed. Spec.):
   W-F-412E Fixtures, Lighting, Incandescent Lamp Industrial
   W-F-1662A Fixture, Lighting Fluorescent (Recessed And Surface Ceiling)
B. American National Standards Institute (ANSI):
   C-81 Electric Lamp Bases and Holders
   C-82 Lamp Ballasts
C. Certified Ballast Manufacturers Association (CBM):
   Requirements for Ballast Certification.
D. Military Standards (MIL-STD):
   461A Electromagnetic Interference Characteristics Requirements for Equipment
   462 Electromagnetic Interference Characteristics, Measurement
   463 Definition and System of Units Electromagnetic Interference Technology
E. National Fire Protection Association (NFPA):
   No. 70 National Electrical Code (NEC)
F. Underwriters Laboratories, Inc. (UL):
   No. 57 Electric Lighting Fixtures
   No. 496 Edison-Base Lampholders
   No. 542 Lampholders, Starters, and Starter Holders for Fluorescent Lamps

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Shall conform to the detail drawings, NEC Article 410 and UL-57.
B. Sheet Metal:
   1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved), and parallel to each other as designed.
   2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
   3. Housing shall be minimum 20 gauge steel.
   4. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
   5. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.
C. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.
D. Lamp Sockets:

1. Fluorescent: Lampholder contacts shall be the biting edge type or phosphorous-bronze with silver flash contact surface type and shall conform to the applicable requirements of UL 542 and ANSI C-81. Contacts for recessed double contact lampholders and for slimline lampholders shall be silver plated. Lampholders for bi-pin lamps, with the exception of those for "U" type lamps, shall be of the telescoping compression type, or of the single slot entry type requiring a one-quarter turn of the lamp after insertion.
2. Incandescent: Shall have porcelain enclosures and conform to the applicable requirements of UL 496.
3. High Intensity Discharge (H.I.D.): Shall have porcelain enclosures and conform to the applicable requirements of ANSI C-81.

E. Recessed incandescent fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.

F. Fluorescent fixtures with louvers or light transmitting panels shall have hinges, latches and safety catches to facilitate safe, convenient cleaning and re-lamping. Vaportight fixtures shall have pressure clamping devices.

G. Mechanical Safety: Lighting Fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by screws, chains, captive hinges or fasteners such that they cannot be accidently dislodged during normal operation or routine maintenance.

H. Metal Finishes:
1. The manufacturer shall apply his standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
2. Interior light reflecting finishes shall be white with not less than 85 percent reflectance, except where otherwise shown on the drawing.
3. Exterior finishes shall be as shown on the drawings.

I. Ballasts for Fluorescent Fixtures: Lamps shall be operated by electronic high-frequency type ballasts. Exception: For special applications, lamp types as noted on drawings shall be operated from core-and-coil ballasts where specifically required on the contract drawings as "core-and-coil".
1. High-Frequency electronic ballasts:
   a. Ballasts shall operate the lamps at a frequency between 20 and 40 KHz from an input frequency of 60Hz.
   b. The lamps shall include the F32T8, 32 watt energy saving type.
   c. Ballast package:

1) Size: The ballast case shall be sized to be physically inter-changeable with standard core and core ballasts and suitable for standard mounting in new or existing lighting fixtures.
2) Case marking: Mark the ballast to indicate the required supply voltage, frequency, RMS current, current surge during starting, input watts, and power factor at the design center voltage, open circuit voltage, crest factor and efficacy.

d. Performance:
1) Light output:
   a) At the design voltage, the light output shall be at least equal to that obtained by a core-and-coil ballasted system meeting ANSI and CBM standards. The comparison test shall be measured in the same fixture at 25 degrees C (plus or minus one degree) ambient room temperature.
   b) Tests shall be made in fixtures designed only for the number of lamps being tested.
   c) For other applications (higher ambients, etc.) the tests should be operated with equivalent lamp wall temperatures plus or minus 4 degrees C.
2) Efficacy: The efficacy of the high-frequency, electronically ballasted system shall be at least 15 percent greater than the equivalent CBM core-and-coil ballasted system (see "Light output" above).
3) Starting: The ballast shall be capable of starting F32-T8, 32 watt lamps at an ambient temperature of 10 degrees C (50 degree F) or more for an input voltage of plus or minus 10 percent about the center design voltage. The ballast shall never be started in the instant start mode at any temperature.
4) Operation:
   a) The ballast shall safely and reliably operate in a room ambient temperature from 10 degrees C (50 degree F) to 40 degrees C (105 degree F).
   b) The light output shall not vary by more than plus or minus 15 percent for a plus or minus 10 percent variation of the input voltage about the center design voltage.
   c) The ballast shall operate the lamps in a manner that will not adversely curtail the normal life of the lamp.
5) Surge withstand capability: The ballast shall be able to with-stand a single input surge of 6,000 volts from a 50 ohm 50 KHz damped sinewave source.
6) Flicker: The flicker shall be less than 5 percent.
7) Noise: The audible noise levels should be equivalent to the Class A rating of CBM certified ballasts.

8) Electromagnetic interference (EMI): The EMI, conducted and radiated, shall meet the Federal Communication Commission's Part 18 Subsection H.
9) Rated life: The ballast shall have a rated life of 10 years or 30,000 hours (based on a 10 hour day).
10) Lamp type: The two lamp ballast shall safely operate two F32T8 RS 32 watt lamps or two FT32T8/U lamps. The single lamp ballast shall safely operate one F32T8 RS lamp, one F40T12 RS energy efficient (35/34) watt lamp or one F32T8/U lamp.
11) Power factor: Not less than 90 percent
12) Total harmonic distortion to be 10% or less.

e. Reliability:
1) Labels: Ballasts must be labeled or listed by UL or ETL.
2) Submit, simultaneously with shop drawings, a certified test report by an independent testing laboratory showing that the electronic ballasts meet or exceed all the performance requirements in this specification.

2. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.
3. To facilitate multi-level lamp switching, lamps within fixture shall be wired with the outermost lamp at both sides of the fixture on the same ballast, the next inward pair on another ballast and so on to the innermost lamp (or pair of lamps). Within a given room, each switch shall uniformly control the same corresponding lamp (or lamp pairs) in all fixture units that are being controlled.
4. Where three-lamp fixtures are indicated, unless switching arrangements dictate otherwise, utilize a common two-lamp ballast to operate the center lamp in pairs of adjacent units that are mounted in a continuous row. The ballast fixture and slave-lamp fixture shall be factory wired with leads or plug devices to facilitate this circuiting. Individually mounted fixtures and the odd fixture in a row shall utilize a single-lamp ballast for operation of the center lamp.

J. Provide all lighting fixtures with a specific means for grounding their metallic wireways and housings to an equipment grounding conductor.

K. Lighting Transmitting Components for Fluorescent Fixtures:
1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
2. Flat lens panels shall have not less than 3 mm (1/8 inch) of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.

3. Unless otherwise specified lenses and diffusers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, and as shown on the drawings.

B. Align, mount and level the lighting fixtures uniformly.

C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Resident Engineer.

D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.

E. Lighting Fixture Supports:

1. Shall provide support for all of the fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
2. Shall maintain the fixture positions after cleaning and relamping.
3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
4. Hardware for recessed lighting fixtures:
   a. All fixtures mounting devices connecting fixtures to the ceiling system or building structure shall have a capacity for a horizontal force of 100 percent of the fixture weight and a vertical force of 400 percent of the fixture weight.
   b. Mounting devices shall clamp the fixture to the ceiling system structure (main grid runners or fixture framing cross runners) at four points in such a manner as to resist spreading of these supporting members. Each support point device shall utilize a screw or approved hardware to "lock" the fixture housing to the ceiling system, restraining the fixture from movement in any direction relative to the ceiling. The screw (size No. 10 minimum) or approved hardware shall pass through the ceiling member (T-bar, channel or spline), or it may extend over the inside of the flange of the channel (or spline) which faces away from the fixture, in a manner which prevents any fixture movement.
   c. In addition to the above the following are required for fixtures exceeding 9 kg (20 pounds) in weight. Note: Ceiling types are defined in ASTM Standard C635-69.
      1) Where fixtures mounted in "Intermediate" and "Heavy Duty" ceilings weigh between 9 kg and 25 kg (20 pounds and 56 pounds) provide two 12 gauge safety

hangers hung slack between diagonal corners of the fixture and the building structure.

2) Where fixtures weigh over 25 kg (56 pounds) they shall be independently supported from the building structure by approved hangers. Two-way angular bracing of hangers shall be provided to prevent lateral motion.

d. Where ceiling cross runners are installed for support of lighting fixtures, they must have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.

5. Surface mounted lighting fixtures:

a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts (or stud-clips) shall be minimum 1/4-20 - secured to main ceiling runners and/or secured to cross runners. Non-turning studs may be attached to the main ceiling runners and cross runners with special non-friction clip devices designed for the purpose, provided they bolt through the runner, or are also secured to the building structure by 12 gauge safety hangers. Studs or bolts securing fixtures weighing in excess of 25 kg (56 pounds) shall be supported directly from the building structure.

b. Where ceiling cross runners are installed for support of lighting fixtures they must have a carrying capacity equal to that of the main ceiling runners and be rigidly secured to the main runners.

c. Fixtures less than 6.8 kg (15 pounds) in weight and occupying less than 600 mm x 600 mm (two square feet) of ceiling area may, (when designed for the purpose) be supported directly from the outlet box when all the following conditions are met.

1) Screws attaching the fixture to the outlet box pass through round holes (not key-hole slots) in the fixture body.

2) The outlet box is attached to a main ceiling runner (or cross runner) with approved hardware.

3) The outlet box is supported vertically from the building structure.

d. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.

6. Single or double pendent-mounted lighting fixtures:

a. Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure.

7. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling

from the building structure with a nine gauge wire hanger, and secured by approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.

F. Completely lamp each new lighting fixture installed and each existing lighting fixture reinstalled in accordance with following requirements:

1. Fluorescent Lamps:

   a. Standard lamps shall be energy saving type, have a color temperature between 3500 degrees Kelvin and 4100 degrees Kelvin, a color rendering index (CRI) not less than 69 and an initial lumen output not less than 2900. "U" tube lamps shall have the same color temperature and CRI limits as the above.

G. Contractor shall coordinate between the electrical and ceiling trades to ascertain approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.

---END---

SECTION 16763 - ALERT BUTTON ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the minimum requirements for a complete Alert Button Alarm System (ABAS).

B. The system shall utilize microprocessor technology. Functionality and addressing of devices shall be programmable so that devices can be programmed to operate with specified operator stations. Various components of the system shall include,

- Control Panel
- Operator stations
- Alert buttons
- Alarm light
- Cabling to home run each device back to the control panel

C. Any item necessary to meet these functional requirements and not specifically identified in this specification will be deemed part of this specification and provided for by the contractor as part of the bid amount. The fact that a contractor chooses not to provide a function or that a bidder has obtained prior approval of their equipment in no way releases the contractor from complying with these specifications.

D. System Manufacturer - Digital Monitoring Products
System Supplier - Fisher Systems, contact Jim Aarstad 208-746-1071

E. Prior to bid, the Contractor shall identify to the Resident Engineer any system operational features which he does not understand or cannot provide. Otherwise it will be expected that the system provided will meet the requirements of the specifications and be equal to the specified system.

1.2 RELATED WORK

A. Section 16050, BASIC METHODS AND REQUIREMENTS (ELECTRICAL).

B. Section 16111, CONDUIT SYSTEMS.

C. Section 16127, CABLES, LOW VOLTAGE (600 Volts and Below).
Other than the specific requirements of this section, all work shall be accomplished in accordance with all other applicable sections of Division 16 specification.

1.3 QUALITY ASSURANCE

A. The authorized representative of the ABAS manufacture shall be responsible for satisfactory operation of the system and its certification as required by the Resident Engineer.

B. All components, unless otherwise specified, shall be the product of one manufacturer, who has manufactured these types of systems for at least 10 years. The System Supplier shall be an authorized representative of the manufacturer and have at least 10 years experience in the installation and maintenance of similar systems and for a minimum of 5 years have continuously represented the system manufacturer being submitted. The manufacturer shall have had experience with three or more installations of systems of comparable size and complexity as regards to coordinating, engineering, testing and supervising. The System Supplier shall be qualified to service and support the system from a location within a 200-mile radius of the project site.

C. Prior to review of submittals the Government reserves the right to:

1. Have the manufacturer submit a list of locations of similar installations.
2. Inspect any of these installations and question the user concerning the installations without the presence of the supplier.

D. All equipment shall be installed in accordance with the instructions and recommendations of the manufacturer.

E. System supplied shall be equal to the specified system and shall have the same programmable functionality.

1.4 SUBMITTALS

A. Submit in accordance with Section SAMPLES AND SHOP DRAWINGS and Section BASIC METHODS AND REQUIREMENTS (ELECTRICAL).

B. Shop Drawings (See Paragraph 1.4.E for Required Certifications):

1. Submit shop drawings and catalog cuts for approval in accordance with Section SAMPLES AND SHOP DRAWINGS
2. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with contract drawings and specifications. Provide bill of materials which lists components and devices and associated model number. For each item on bill of material provide manufacturer's information and catalog sheets showing the dimensions, electrical characteristics, connection requirements.

4. Shop drawings shall include wiring diagram showing the interconnection of all devices along with termination points of each wire. Provide floor plan drawing showing planned location of all devices, conduit, cable and wire requirements and mounting height requirements.
5. Include information indicating who will certify the system and who will perform the guarantee period services.
6. Provide test procedure for the system performance and functional testing.

C. Manuals:

1. Submit copies of operating and technical maintenance manuals including technical data sheets, schematics, wiring diagrams, and information for ordering replacement parts.
   a. Wiring diagrams shall have their terminals identified.
   b. Wiring diagrams shall indicate internal wiring
2. Two weeks prior to final inspection, deliver four copies of final updated operating and maintenance manual to the Resident Engineer.
   a. Update the manual to include any information necessitated by shop drawing approval.
   b. Include complete "As Installed" wiring and schematic diagrams which show all items of equipment and their interconnecting wiring.
   c. Show all terminal identifications.
   d. Include information for testing, repair, trouble shooting, assembly, disassembly and recommended maintenance intervals.
   e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
   g. Furnish manuals in loose-leaf binder or manufacturer's standard binder.
   h. Furnish documentation of the installed program.

D. Test Equipment List: The Contractor shall be responsible for furnishing all test equipment required to test the system in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the system. The Contractor shall furnish test equipment of an accuracy better than the parameters to be tested. The test equipment calibration shall be traceable to the National Institute of Standards Technology.

E. Certifications:

1. Together with the shop drawing submittal, submit certification from the equipment manufacturer indicating that the System Supplier is an authorized representative of the

equipment manufacturer capable of performing the installation and maintenance. Include the individual's exact name and address in the certification.

2. Together with the shop drawing submittal, submit a written certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL 1069 requirements and the requirements set forth by the equipment manufacturer for the proper performance of the system. The Government will not approve any submittal without this certification.
3. Two weeks prior to the final inspection, deliver to the Resident Engineer four copies of a certificate from the System Supplier, stating that the system has been properly installed, adjusted and tested.

1.5 GUARANTEE PERIOD SERVICES

A. Furnish and guarantee maintenance service for the system using authorized representatives of the manufacturer of the equipment for a period of one year after acceptance of the installation by the Government.

B. Maintenance service shall include the following:

1. Responding to call within four hours of notification of system troubles.
2. Repair and replace parts and equipment as necessary to keep the system in optimum operating condition and proper working order.
3. Furnishing tools, test instruments and parts required.

C. Work not included: Maintenance service shall not include the performance of any work due to improper use, accidents, or negligence for which the Contractor is not directly responsible.

1.6 CODES AND STANDARDS

All systems and equipment shall be UL listed and labeled.

A. The current edition of the publications listed below form a part of this specification.

B. National Fire Protection Association (NFPA):

70 . . . . . National Electrical Code (NEC)

99 . . . . . Standards for Health Care Facilities

1.7 TRAINING

System Supplier shall conduct training sessions for operating and maintenance staff as designated by the Resident Engineer. Provide training on all operational and maintenance functions.

PART 2 - PRODUCT

2.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to the job site in manufacturer's original unopened containers, clearly labeled with the manufacturer's name and equipment model identification number.

B. Storage and Handling: Store and protect equipment in a manner which will preclude damage.

2.2 NEW EQUIPMENT REQUIREMENTS

A. All equipment to be supplied under this specification shall be new and the current model of a standard product of a manufacturer of record. A manufacturer of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied.

B. For each item of equipment offered, manufacturer shall maintain:

1. A factory production line.
2. A stock of replacement parts.
3. Engineering drawings, specifications, operating manuals and maintenance manuals.

C. Manufacturer shall have published and distributed descriptive literature and equipment specifications on each item of equipment offered.

D. System supplier shall configure and program to optimize the system for this application.

2.3 EQUIPMENT COMPATIBILITY REQUIREMENTS

A. While individual items of equipment may meet the equipment specifications, and in fact, meet the system specifications when electrically associated with other equipment, the total system shall operate so that the combination of equipment actually employed does not produce any undesirable effects such as signal distortion, noise pulses, data noise, transients, phantom calls or other interferences.

B. The Contractor shall provide verification in writing that the type wire/cable being furnished and installed is recommended by the system manufacturer and will provide a total system

free of undesirable effects listed in paragraph 2.3.A. The Contractor shall make changes as necessary to the installation to resolve undesirable effects.

2.5 EQUIPMENT SPECIFICATIONS

A. Specifications of component equipment as set forth in this specification are minimum specifications, unless otherwise stated, and shall not be construed as limiting the overall quality, quantity or performance characteristic of items furnished in the system. The Contractor shall be responsible for the supply, performance and overall quality of the Contractor Furnished Equipment.

B. Standards and Testing: All supplies, materials or equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to conform with UL standards where such standards have been established for the supplies, materials or equipment.

C. Equipment General Requirements:

1. All devices shall be hardwire connected to the control panel and shall be addressed and monitored as programmed in the control panel.
2. The system shall utilize microprocessor components for all signaling and programming circuits and functions. Program memory shall be non-volatile or protected from erasure from power outages.
3. Equipment shall be rated for continuous duty.
4. The System Supplier shall install and be responsible for the satisfactory total system operation and its certification.
5. All voltages, except for the primary power to the amplifier circuits, shall not exceed 30 volts AC RMS or 41.2 volts DC.
6. Color code all wiring. All equipment wiring, terminals and cables shall be clearly and permanently labeled to facilitate installation and maintenance.
7. When an alarm occurs after button is pushed then system shall not reset until acknowledged at the operator station.
8. Program system to that buttons annunciate an alarm at the associated team's operator station. And all alarms shall be annunciated at the main operator station.
9. Alarm light above each door shall turn On when the room button is pushed and shall remain On until system is reset.
10. System shall be furnished and installed, as recommended by the system manufacturer.

2.6 EQUIPMENT AND DEVICES

A. Control Panel shall be XR500 Series.
B. Pushbutton shall be RCI 908 Series, maintained contact., mark "EMERGENCY" on button or faceplate.
C. Alarm lights shall be Dabmar Lighting LV-LED60
D. Operator station shall be Aqualite LCD keypads
E. Provide all parts, devices and components as needed for a complete and operable system

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall install equipment in a manner which complies with National Electrical Code (NEC), accepted industry standards of good practice, the requirements of this specification, and in a manner which does not constitute a safety hazard.
B. The Contractor shall insure that the installation personnel understand all the requirements of the specification.
C. At the final inspection, the System Supplier of the system shall perform the tests specified herein under Article, FIELD QUALITY ASSURANCE. The System Supplier shall demonstrate that the system functions properly in every respect in the presence of the Resident Engineer.

3.2 GROUNDING

The Contractor shall ground all equipment in accordance with the and the NEC and other applicable NFPA standards, to eliminate all shock hazards and to minimize all ground loops, common mode returns, noise pickup, crosstalk, or other interferences.

3.3 SYSTEM WIRING

A. Cable type, wiring and wiring method shall be in accordance with NEC and equipment manufacturer's requirements and shop drawings. Use plenum rated cable in plenums.
All conduit and cables shall be hidden in finished areas.
Final connections between the equipment and the wiring system shall be made under the supervision of the System Supplier.
B. AC power shall be run separately from the low voltage signal cables.
C. Grommets/bushings shall be provided to protect cabling penetrating through counter or wall openings.

D. Provide conduit, boxes, fittings, hangers and supports in accordance with other applicable sections of this specification. Size and type of outlet and back boxes shall be in accordance with System Supplier requirements. Minimum size of junction boxes shall be 4" square.

E. Provide copper wires. Provide cable type and size as required by the system manufacturer. If single conductor is used, minimum size shall be #14 THWN.
Low voltage wiring shall not be installed in conduits, junction boxes, or outlet boxes with lighting or power circuits. All cables at terminal connection points shall be marked in accordance with the submittal wiring diagrams.

F. Install cables in conduits in the following locations,
- Inaccessible locations
- In walls
- Embedded in floors
- Exterior locations
- Surface cable routed down walls from the ceiling space shall be routed in raceways.

Size conduits in accordance with NEC and System Supplier requirements
Individual wires shall be installed in conduit.

G. Cables routed through accessible areas shall be supported by means of hooks, rings, brackets or cable tray. Route cables at least 1 foot above the suspended ceiling. Cables shall not be laid on top of the ceiling tiles or interfere with removal of ceiling tiles or interfere with access to equipment for maintenance. Cables shall be supported or attached at 2 foot intervals.

H. Provide junction boxes and outlet boxes as needed for complete installation. Minimum size of boxes shall be 4-inches square x 2-1/8 inches deep unless otherwise needed.

I. Final connections between the equipment and the wiring system shall be made under the supervision of the System Supplier by a Nicet Level 2 technician.

3.4 SYSTEM PROGRAMMING

A. Prior to programming the system, the System Supplier shall meet with the Resident Engineer to discuss options and configurations which can be programmed into the system. The System Supplier will then program the system based upon information obtained from this meeting.

3.5 FIELD QUALITY ASSURANCE

A. System Pretest:

1. Upon completing installation of the system, align and balance the system and perform complete system pretesting. After pretesting the system shall be formally tested in the presence of the Resident Engineer.
2. During the system pretest, verify that the system is fully operational and meets all the system performance requirements of the specification.

C. Acceptance Testing:

The Contractor shall notify the Resident Engineer in writing seven days after the pretest has been completed and 30 days prior to the date that acceptance testing is expected to begin. The system shall be tested in the presence of the Resident Engineer. The testing shall demonstrate that the the system meets all of the requirements of the specification and complies with all appropriate standards listed in this specification and is fully operational and is programmed in accordance with the requirements of the Resident Engineer.

D. After the systems have been in operation for 60 days the system supplier shall visit the job site and discuss the operation of the system with the maintenance and operations people and make any configuration or program changes to optimize the system for the Owner's use. This trip is in addition to any other trips required to fix problems or failures of the hardware or software. This trip should be scheduled after all other such problems have been resolved.

---END---