**VA MEDICAL CENTER, MANHATTAN, NY**
**TASK ORDER VA101F-13-J-0204**
**Project Number 630-600**

Project Location:

VA NY Harbor Healthcare System
Manhattan Campus
423 East 23rd Street
New York, NY 10010

Project Title: Sterile Processing Service (SPS),
Phase 1B Ground Floor

Submission Type: Issue For Construction Submission
Volume 1 of 2

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**DEPARTMENT OF VETERANS AFFAIRS**
**VHA MASTER SPECIFICATIONS**

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| GI002 | Partial Ground Floor Life Safety Plan |
| GI003 | Abbreviations, Symbols & General Notes |
| GI004 | Partial Ground Floor Infection Control Plan |
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| GI006 | First Through Fifth Floor Infection Control Partial Plans |
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| GI008 | Site Plan |
| | **ARCHITECTURAL** |
| AD110 | Ground Floor Partial Demolition Plan |
| AE110 | Ground Floor Partial Key Plan |
| AE111 | Ground Floor Partial Plan Part 01 |
| AE112 | Ground Floor Partial Plan Part 02 |
| AE113 | Ground Floor Partial Plan Part 03 |
| AE114 | Ground Floor Partial Plan Part 04 |
| AE115 | Ground Floor Partial Plan Part 05 |
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| AE170 | Seventh Floor Plan |
| AE180 | Roof Plan |
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| AE501 | Details |
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| AE503 | Details |
| AE504 | Details |
| AE601 | Partition Types & Details |
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|---|---|
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| MI110 | Mechanical Controls Details |
| MI111 | Mechanical Controls Details |
| MI112 | Mechanical Controls Details |

**ELECTRICAL**

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| EG002 | Electrical Symbols and Abbreviations |
| ED110 | Ground Floor Plan Demolition |
| EL003 | Luminaire Schedule & Wiring Diagrams |
| EL111 | Ground Floor Lighting Plan - Part 01 |
| EL112 | Ground Floor Lighting Plan - Part 02 |
| EL113 | Ground Floor Lighting Plan - Part 03 |
| EL114 | Ground Floor Lighting Plan - Part 04 |
| EL115 | Ground Floor Lighting Plan - Part 05 |
| EP111 | Ground Floor Partial Plan - Part 01 |
| EP112 | Ground Floor Partial Plan - Part 02 |
| EP113 | Ground Floor Partial Plan - Part 03 |
| EP114 | Ground Floor Partial Plan - Part 04 |
| EP115 | Ground Floor Partial Plan - Part 05 |
| EP170 | Seventh Floor Plan |
| EY111 | Ground Floor Partial Plan - Part 01 |
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| EY113 | Ground Floor Partial Plan - Part 03 |
| EY114 | Ground Floor Partial Plan - Part 04 |
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| PP1U1 | Plumbing Under Slab Plan |
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| PP113 | Plumbing Ground Floor Plan - Part 03 |
| PP114 | Plumbing Ground Floor Plan - Part 04 |
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# SECTION 01 00 00
# GENERAL REQUIREMENTS

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# SECTION 01 00 00
# GENERAL REQUIREMENTS

## 1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for renovations and repairs to existing Sterilization Processing Services and adjacent interior spaces; and alteration/expansion of associated mechanical, electrical and plumbing components as required by drawings and specifications.

B. Visits to the site by Bidders may be made only by appointment with the VA Contracting Officer.

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

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

E. 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.

F. Training:

1. All supervisory and forepersons for the general contractor and subcontractors that are working on site shall have the 30-hour OSHA certified Construction Safety course and/or other relevant competency training, as determined by RE/COR acting as the Construction Safety Officer with input from the facility Construction Safety Committee.
2. All other employees of the general contractor and subcontractors of non-supervisory employment that are working on site shall have the 10-hour OSHA certified Construction Safety course training.
3. Submit training records of all such employees for approval before the start of work.

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

H. Comply with requirements of FAR 25.5 Buy American Act – Construction Materials.

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

A. ITEM I, GENERAL CONSTRUCTION: Work includes general construction, alterations, mechanical, plumbing, and electrical work, medical equipment, utility systems, dumbwaiters, necessary removal of existing structures and construction and certain other items.

**1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

A. AFTER AWARD OF CONTRACT, electronic copies of specifications and drawings will be furnished.

B. Hardcopy sets of drawings may be made by the Contractor, at Contractor's expense.

**1.4 RELATED WORK - MINIMUM WORK PERFORMANCE REQUIREMENTS**

A. Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and drawings to produce a system complete, functional and ready for the purpose intended. No statements herein shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

B. General Contractor shall assure that all trades are aware of their respective full scope of work. Contractor shall procure all necessary permits and inspections. Refer to all contract drawings, specifications and notes for additional responsibilities, details and scope of work. All work shall be performed by personnel properly skilled in the task they are performing and aware of their project responsibilities. Workmanship shall be the best of their respective kind using the most modern approved methods and materials. General Contractor shall directly supervise all phases of construction, and the supervisor shall have full authority to act on field conditions associated with all trades to prevent construction delays. Daily work logs shall be issued to the VA Resident Engineer describing in detail the manpower, man-hours, work performed by each trade,

**1.5 COORDINATION**

A. Coordinate work and products meeting the requirements associated with all applicable specification sections (including referenced applicable publications) and drawings to produce a system complete, functional and ready for the purpose intended.

B. Pre-worksite Re-visit Requirements: Before starting work in a particular area, visit the worksite and carefully examine the areas to verify complexity, existing conditions and difficulties that will affect work including all work done under various specification sections and the VA.

C. Commencement of work shall be construed as acceptance of the existing conditions and difficulties. No change to the contract price or schedule shall be allowed for work caused by unfamiliarity with the site conditions that are visible or readily construed by an experienced observer.

**1.6 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL**

A. Contractor shall provide full time Quality Assurance/Quality Control inspector on construction site for daily monitoring of quality of work.
   1. Submit Daily Construction Quality Control Report fully describing preparatory inspection, initial inspection, and follow-up inspection.
   2. Contractor shall obtain the services of a third part to provide independent tests required by the Contract Documents.

**1.7 HEALTH AND SAFETY**

A. Applicable Publications: Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
   1. American Society of Safety Engineers (ASSE):
      A10.1.....Pre-Project & Pre-Task Safety and Health Planning
      A10.34.....Protection of the Public on or Adjacent to Construction Sites
      A10.38.....Basic Elements of an Employer’s Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations
   2. American Society for Testing and Materials (ASTM):
      E84-2009.....Surface Burning Characteristics of Building Materials
   3. The Facilities Guidelines Institute (FGI):
      FGI Guidelines.....Guidelines for Design and Construction of Healthcare Facilities
   4. National Fire Protection Association (NFPA):
      10-2010.....Standard for Portable Fire Extinguishers
      30-2008.....Flammable and Combustible Liquids Code
      51B-2009.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
      70-2011.....National Electrical Code
      70E-2012.....Standard for Electrical Safety in the Workplace
      101-2010.....Life Safety Code

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

5. The Joint Commission (TJC):
   TJC Manual .....Comprehensive Accreditation and Certification Manual
6. U. S. Nuclear Regulatory Commission:
   10 CFR 20 .....Standards for Protection Against Radiation
7. U. S. Occupational Safety and Health Administration (OSHA):
   29 CFR 1904 .....Reporting and Recording Injuries & Illnesses
   29 CFR 1910 .....Safety and Health Regulations for General Industry
   29 CFR 1926 .....Safety and Health Regulations for Construction Industry
   CPL 2-0.124.....Multi-Employer Citation Policy
8. VHA Directive 2005-007.

B. Definitions:

1. OSHA “Competent Person” (CP): One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).
2. "Qualified" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
3. High Visibility Accident: Any mishap which may generate publicity or high visibility.
4. Medical Treatment: Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
5. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:
   a. Death, regardless of the time between the injury and death, or the length of the illness;
   b. Days away from work (any time lost after day of injury/illness onset);
   c. Restricted work;
   d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above.

C. Regulatory Requirements:

1. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the VA Office of Construction and Facilities Management (OCFM) and the VHA Office of Occupational Safety and Health (10NA8) for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall govern except with specific approval and acceptance by the Resident Engineer.

D. Accident Prevention Plan (APP):

1. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). The Contractor is responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

2. The APP shall be prepared as follows:

a. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.

b. Address both the Prime Contractor’s and the subcontractors’ work operations.

c. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.

d. Address all the elements/sub-elements and in order as follows:

1) **SIGNATURE SHEET**. Title, signature, and phone number of the following:

a) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);

b) Plan approver (company/corporate officers authorized to obligate the company);

c) Plan concurrence (e.g. Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).

2) **BACKGROUND INFORMATION**. List the following:

a) Contractor;

b) Contract number;

c) Project name;

d) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).

3) **STATEMENT OF SAFETY AND HEALTH POLICY**. Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor’s written safety program goals, objectives, and accident experience goals for this contract should be provided.

4) **RESPONSIBILITIES AND LINES OF AUTHORITIES**. Provide the following:

a) A statement of the employer’s ultimate responsibility for the implementation of his SOH program.

b) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.

c) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.

d) Requirements that no work shall be performed unless a designated competent person is present on the job site.
e) Requirements for pre-task Activity Hazard Analysis (AHAs).
f) Lines of authority.
g) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified.

5) **SUBCONTRACTORS AND SUPPLIERS**. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:
a) Identification of subcontractors and suppliers (if known).
b) Safety responsibilities of subcontractors and suppliers.

6) **TRAINING**:
a) Requirements for site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee.
b) Requirements for mandatory training and certifications that are applicable to this project (e.g. explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space, etc.) and any requirements for periodic retraining/recertification.
c) Procedures for periodic safety and health training for supervisors and employees.
d) Requirements for OSHA 10-hour training for all workers on site and the OSHA 30-hour training for Trade Competent Persons (CPs).

7) **SAFETY AND HEALTH INSPECTIONS**:
a) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g. “Site Safety and Health CP”), proof of inspector’s training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.
b) Any external inspections/certifications that may be required (e.g. contracted CSP or CSHT).

8) **ACCIDENT INVESTIGATION AND REPORTING**. The Contractor shall conduct mishap investigations of all OSHA Recordable Incidents. The App shall include accident/incident investigation procedure

and identify person(s) responsible to provide the following to the RE Office:

a) Exposure data (man-hours worked).

b) Accident investigations, reports, and logs.

9) **PLANS (PROGRAMS, PROCEDURES) REQUIRED**. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

a) Emergency response.

b) Contingency for severe weather.

c) Fire Prevention.

d) Medical Support.

e) Posting of emergency telephone numbers.

f) Prevention of alcohol and drug abuse.

g) Site sanitation (housekeeping, drinking water, toilets).

h) Night operations and lighting.

i) Hazard communication program.

j) Welding/Cutting “Hot” work.

k) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E).

l) General Electrical Safety.

m) Hazardous energy control (Machine LOTO).

n) Site-Specific Fall Protection and Prevention.

o) Excavation/trenching.

p) Asbestos abatement.

q) Lead abatement.

r) Crane Critical lift.

s) Respiratory protection.

t) Health hazard control program.

u) Radiation Safety Program.

v) Abrasive blasting.

w) Heat/Cold Stress Monitoring.

x) Crystalline Silica Monitoring (Assessment).

y) Demolition plan (to include engineering survey).

z) Formwork and shoring erection and removal.

aa) Precast Concrete.

3. Submit the APP to the Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP

DRAWINGS, PRODUCT DATA AND SAMPLES ten (10) calendar days after the date of the contract award. Work cannot proceed without an accepted APP.

4. Once accepted by the Resident Engineer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.
5. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Resident Engineer. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.

E. Activity Hazard Analyses (AHAs):

1. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site).
2. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
3. Work shall not begin until the AHA for the work activity has been accepted by the Resident Engineer and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
   a. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be

submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.

b. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

1) If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.

2) If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

c. Submit AHAs to the Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

d. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

e. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the Resident Engineer.

F. Preconstruction Conference:

1. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.

2. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
3. Deficiencies in the submitted APP will be brought to the attention of the Contractor within five (5) days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

G. Site “Safety and Health Officers” (SSHO) and “COMPETENT PERSONS” (CPs):

1. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the “Site Safety and Health Officer” (SSHO) to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one “Competent Person” (CP) in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a “Trade CP” to administer their individual safety programs.
2. Further, all specialized “Competent Persons” (additional “Trade Safety and Health CPs” as necessary) for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations.
3. These “Competent Persons” can have collateral duties as the subcontractor’s superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e., Asbestos, Electrical, Cranes, Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
4. The “Site Safety and Health Officer” or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. “Trade Safety and Health CPs” will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated Site Safety and Health CP and Trade Safety and Health

CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

5. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

H. Training:

1. The designated Prime Contractor "Site Safety and Health Officer" must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. At a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
2. All designated "Trade Safety and Health CPs" shall have completed the OSHA 30-hour Construction Safety course within the past three (3) years.
3. In addition to the OSHA 30-hour Construction Safety Course, all "Trade Safety and Health CPs" with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition and control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
4. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
5. Submit training records associated with the above training requirements to the Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES prior to the date of the preconstruction conference for acceptance.

6. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the "Site Safety and Health Officer" or his/her designated representative. At a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting, etc. Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
7. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

I. Inspections:

1. The "Site Safety and Health Officer" shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors "Trade Safety and Health CPs" shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the "Site Safety and Health Officer" shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Resident Engineer.
2. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
   a. Results of the inspection will be documented with tracking of the identified hazards to abatement.
   b. The Resident Engineer shall be notified immediately prior to start of the inspection and invited to accompany the inspection.
   c. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
   d. A report of the inspection findings with status of abatement will be provided to the Resident Engineer within one (1) week of the onsite inspection.

J. Accident, OSHA 300 Logs, and Man-Hours:

1. Notify the Resident Engineer as soon as practical, but no more than four (4) hours after any accident meeting the definition of OSHA Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Resident Engineer can determine whether a government investigation will be conducted.
2. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least $20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162, and provide the report to the Resident Engineer within five (5) calendar days of the accident. The Resident Engineer will provide copies of any required or special forms.
3. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Resident Engineer on a monthly basis.
4. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Resident Engineer on a monthly basis. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Resident Engineer as requested.

K. Personal Protective Equipment (PPE):
1. PPE is governed in all areas by the nature of the work the employee is performing.
2. Mandatory PPE includes:
   a. Hard Hats – unless written authorization is given by the Resident in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. However even with authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.

b. Safety glasses - unless written authorization is given by the Resident Engineer safety glasses meeting the ANSI Z87.1 standard must be worn by each person on site.

c. Appropriate Safety Shoes – based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Resident Engineer. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

L. Electrical:

1. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J – General Environmental Controls, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.
2. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians in the state where the project is located. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
3. **All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition** (i.e. anything beyond simple testing and troubleshooting with a multimeter). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Resident Engineer with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.

   a. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.

b. Verification of the absence of voltage after de-energization and lockout/tagout is considered “energized electrical work” (live work) under NFPA 70 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.

c. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the Resident Engineer.

4. Before beginning any electrical work, an AHA will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alterative and it is strongly suggested a full Shock and Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity has been accepted by the Resident Engineer and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.

5. Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. “Assured Equipment Grounding Conductor Program” only is not allowed.

M. Fall Protection:

1. The **fall protection (FP) threshold height requirement is 1.8 m (6 feet) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent**, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.

a. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.

b. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.

c. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the

area between the roof or floor edge and the WLS without FP. Fall Protection is required when working outside the WLS.

d. Fall protection while using a ladder will be governed by the OSHA requirements.

N. Scaffolds and Other Work Platforms:

1. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L and in accordance with the specifications included within this section.
2. The **fall protection (FP) threshold height requirement is 1.8 m (6 feet) as stated in Paragraph M. above**.
3. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
   a. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.
   b. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.
   c. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
   d. Emergency descent devices shall not be used as working platforms.
4. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:
   a. The Competent Person’s name and signature.
   b. Dates of initial and last inspections.
5. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 6 m (20 feet) in height, positive fall protection shall be used.

O. Excavation and Trenches:

1. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P and in accordance with the specifications included within this section.
2. All excavations and trenches 1.5 m (5 feet) in depth or greater shall require a written trenching and excavation permit (NOTE – some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall be completed and provided to the Resident Engineer prior to commencing work for the day. At the end of the day, the permit shall be closed out and

provided to the Resident Engineer. The permit shall be maintained onsite and include the following:

a. Determination of soil classification.
b. Indication that utilities have been located and identified. If utilities could not be located after all reasonable attempt, then excavating operations will proceed cautiously.
c. Indication of selected excavation protective system.
d. Indication that the spoil pile will be stored at least 0.6 m (2 feet) from the edge of the excavation and safe access provided within 7.6 m (25 feet) of the workers.
e. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere.

3. If not using an engineered protective system such as a trench box, shielding, shoring, or other Professional Engineer designed system and using a sloping or benching system, soil classification cannot be Solid Rock or Type A. All soil will be classified as Type B or Type C and sloped or benched in accordance with Appendix B of 29 CFR 1926.

P. Cranes:

1. All crane work shall comply with 29 CFR 1926 Subpart CC and in accordance with the specifications included within this section.
2. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no “Phase In” date of November 10, 2014.
3. Crane operators shall not carry loads:
   a. over the general public or VAMC personnel;
   b. over any occupied building unless:
      1) the top two floors are vacated; or
      2) overhead protection with a design live load of 300 psf is provided.

Q. Control of Hazardous Energy (LockOut/TagOut):

1. All maintenance and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete and masonry equipment [1926.702(j)], heavy machinery and equipment [1926.600(a)(3)(i)], and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Paragraph M. above to include NFPA 70E and other VA specific requirements discussed in the section.

R. Confined Space Entry:
   1. All maintenance and servicing of equipment or machinery shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].
   2. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the Resident Engineer and coordinated with the Facility Safety.

**1.8 PARKING**

A. Contractor shall notify the VA Resident Engineer in writing two (2) weeks in advance of decommissioning any VAMC parking spaces due to construction.
B. Contractor shall provide VA Resident Engineer a list of all affected parking spaces; no parking space shall be decommissioned without prior written approval from the COTR of record.
C. Contractor shall procure secure offsite parking for vehicles which have been affected as a result of any phase, activity, specification, or component of this project. Secure offsite parking shall be within 1/4 mile of the VAMC, shall be accessible 24 hours a day 7 days per week for the duration of the project. Contractor shall be responsible for all associated parking fees until completion of project or related phase, as mutually agreed to, in advance by Contractor and the Contracting Offices. Parking fees are payable in advance and Contractor is responsible for the coordination of activity. In no instance shall the Contractor be relieved of these responsibilities. Quantity of spaces and acceptance of proposed offsite parking is subject to the approval of the Contracting Officer.

**1.9 CONSTRUCTION SECURITY REQUIREMENTS**

A. Security Plan:
   1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
   2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.
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 five (5) days' notice to the

Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from 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 shutdown the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.
5. The Contractor shall provide a 24-hour fire watch of the construction area when fire alarm system is inactive and until the fire alarm system has been accepted. Submit proposed fire watch plan in writing to Resident Engineer for review prior to start of construction. An approved plan shall be implemented without further notice.

C. Secure Project Site:

1. The General Contractor shall provide unarmed guards at the project site after construction hours; duties to include monitoring safety and security fencing, monitoring fire and life safety concerns, ensuring project doors are closed and locked, and ensuring hazardous materials and equipment are stored and/or secured in a manner acceptable to VA Resident Engineer.
2. The guard shall have communication devices to report events as directed by VA police.

D. Key Control:

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 emergency action.
2. The General Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

E. Document Control:

1. Before starting work, the General Contractor/Sub Contractors 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.

3. 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.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD’s and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of “sensitive information”.
7. 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 vehicles 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 to before 7:00 a.m. and after 4:00 p.m.

**1.10 FIRE SAFETY**

A. Fire Safety Plan: Establish and maintain a site-specific 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 Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan (described in Article 1.7, HEALTH AND SAFETY).

B. 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.

C. 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 3 m (10 feet).

D. Temporary Construction Partitions:

1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and the areas that are described in these General Requirements and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, 3/4-hour fire/smoke rated doors with self-closing devices.
2. Install two-hour fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.

E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.

F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with the Resident Engineer.

G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to the Resident Engineer.

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

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

J. 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 Resident Engineer. All existing or temporary fire

protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.

K. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Resident Engineer.

L. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Resident Engineer. Obtain permits from Resident Engineer at least 72 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

M. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Resident Engineer.

N. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

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

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

**1.11 OPERATIONS AND STORAGE AREAS**

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

1. Site access shall be from East 25th Street. The Loading Dock shall NOT be available to the Contractor and the subcontractors.

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 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 damaged curbs, sidewalks, or roads.

**(FAR 52.236-10)**

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

E. Workmen are subject to rules of the Medical Center applicable to their conduct.

F. Execute work so as to interfere as little as possible with normal functioning of the Medical Center as a whole, including operations of utility services, fire protection systems and existing equipment, and with work being done by others. Work shall be accomplished during normal work hours, Monday through Friday, 7:00 a.m. to 3:30 p.m. (unless approved by the VA) excluding Federal holidays, as to cause the least interferences possible with the normal activities of the facility and the surrounding areas. 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 the 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.

G. Building will be occupied during performance of work; but immediate areas of alterations will be vacated.

1. Certain areas of the Building will be occupied by Medical Center personnel for various periods as listed below:

| AREA | PERIOD |
|---|---|
| All Levels | Continuous |

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 Center's operations will not be hindered. Contractor shall permit access to Department of Veterans' Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

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

H. Construction Fence: Before construction operations begin, Contractor shall submit a fencing plan for approval by the Resident Engineer. After a plan is approved, Contractor shall provide a chain link construction fence, 2.4 M (8 feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375 mm (15 inches). Bottom of fences shall extend to 25 mm (one inch) above grade. Remove the fence when directed by Resident Engineer.

I. When an area of building is turned over to Contractor, Contractor shall accept entire responsibility therefore.

1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified or directed by the Medical Center Resident Engineer.
2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.

J. Utilities Services: Maintain existing utility services for the 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 energized circuits or equipment shall not commence without the Medical Center Director’s prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS and 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS for additional requirements.
2. Contractor shall submit a request to interrupt such services to Resident Engineer, in writing, ten (10) working days in advance of proposed interruption. Request shall state reason, date, exact time of and approximate duration of such interruption, include a sketch and narrative of areas to be affected. Minor interruptions being two (2) hours of a limited area.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of the Medical Center. Interruption time approved by the Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of systems must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the Resident Engineer. Major interruptions being more than five (5) hours and/or affecting areas on other floors or other departments.
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.

K. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are

abandoned or are expected to be abandoned shall be entirely removed, unless otherwise indicated on the Drawings. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

L. 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.

M. Coordinate the work for this contract with other construction operations and Medical Center's existing use of site as directed by Resident Engineer. This includes attending weekly project coordination meetings with the other on-site contractors, the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS. Other Station construction operations include but are not limited to:
   1. Proposed Perimeter Flood Project.
   2. Proposed Shops, Chapel, Morgue and Security Post 7 Renovations.
   3. Proposed Clinic Renovations.
   4. Proposed Patient Room Renovations.
   5. Proposed Electrical Equipment Relocation.
   6. Proposed Warehouse Renovations.
   7. Proposed MRI Relocation.
   8. On-going Roofing Replacement.
   9. Parking Lifts and Asser Levy Access Parking.

**1.12 ALTERATIONS**

A. Survey: Before work is started, the Contractor shall make a thorough survey with the Resident Engineer and a representative of VA Supply Service, of areas of building in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by all three, to the Contracting Officer. This report shall list by rooms and spaces:
   1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of building.
   2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
   3. Note discrepancies between drawings and existing conditions at site.

4. Designate areas for working space, materials storage and routes of access to areas within building where alterations occur and which have been agreed upon by Contractor and Resident Engineer.

B. Items required by Contract Documents to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Resident Engineer and/or Supply Representative, to be in such condition that their reuse is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).

C. Re-Survey: Thirty (30) days before expected partial or final inspection date, the Contractor and Resident Engineer together shall make a thorough re-survey of the areas of building 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 damages 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 and other damages. 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.

**1.13 INFECTION CONTROL**

A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled

areas that minimize the flow of airborne particles into patient areas. Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.

B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e., Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the Resident Engineer before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the Resident Engineer and Infection Control Manager. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is: **Class IV**, however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows.

1. Class I Requirements:
   a. During Construction Work:
      1) Notify the Resident Engineer.
      2) Execute work by methods to minimize raising dust from construction operations.
      3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.
   b. Upon Completion:
      1) Clean work area upon completion of task.
      2) Notify the Resident Engineer.
2. Class II Requirements:
   a. During Construction Work:
      1) Notify the Resident Engineer.
      2) Provide active means to prevent airborne dust from dispersing into atmosphere.
      3) Water mist work surfaces to control dust while cutting.
      4) Seal unused doors with duct tape.
      5) Block off and seal air vents.
      6) Remove or isolate HVAC system in areas where work is being performed.

b. Upon Completion:
   1) Wipe work surfaces with cleaner/disinfectant.
   2) Contain construction waste before transport in tightly covered containers.
   3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
   4) Upon completion, restore HVAC system where work was performed.
   5) Notify the Resident Engineer.

3. Class III Requirements:
   a. During Construction Work:
      1) Obtain permit from the Resident Engineer and Infection Control Manager.
      2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
      3) Complete all critical barriers (i.e., sheetrock, plywood, plastic) to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
      4) Maintain negative air pressure within work site utilizing HEPA equipped air filtration units and monitored with an alarm device, which must be maintained and monitored by the contractor.
      5) Contain construction waste before transport in tightly covered containers.
      6) Cover transport receptacles or carts. Tape covering unless a solid lid is used.
   b. Upon Completion:
      1) Do not remove barriers from work area until completed project is inspected by the Resident Engineer and Infection Control Manager and thoroughly cleaned.
      2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
      3) Vacuum work area with HEPA filtered vacuums.
      4) Wet mop area with cleaner/disinfectant.
      5) Upon completion, restore HVAC system where work was performed.
      6) Return permit to the Resident Engineer.

4. Class IV Requirements:
   a. During Construction Work:
      1) Obtain permit from the Resident Engineer and Infection Control Manager.
      2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.
      3) Complete all critical barriers (i.e., sheetrock, plywood, plastic) to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
      4) Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.
      5) Seal holes, pipes, conduits, and punctures.
      6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
      7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.
   b. Upon Completion:
      1) Do not remove barriers from work area until completed project is inspected by the Resident Engineer and Infection Control Manager and thoroughly cleaned.
      2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
      3) Contain construction waste before transport in tightly covered containers.
      4) Cover transport receptacles or carts. Tape covering unless a solid lid is used.
      5) Vacuum work area with HEPA filtered vacuums.
      6) Wet mop area with cleaner/disinfectant.
      7) Upon completion, restore HVAC system where work was performed.
      8) Return permit to the Resident Engineer.

C. Barriers shall be erected as required based upon classification (Class III and IV requires barriers) and shall be constructed as follows:

1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:
   a. Class III and IV - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping.
   b. Class III and IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
   c. Class III and IV - Seal all penetrations in existing barrier airtight.
   d. Class III and IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris.
   e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing.
   f. Class III and IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of 0.6 m (2 feet) wide of polyethylene enclosures for personnel access.

D. Products and Materials:
1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes.
2. Barrier Doors: Self Closing Two-hour fire-rated solid core wood in steel frame, painted.
3. Dust proof two-hour fire-rated drywall.
4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer’s instructions.
5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose.
6. Adhesive Walk-off Mats: Provide minimum size mats of 609 mm x 914 mm (24 inches x 36 inches).
7. Disinfectant: Hospital-approved disinfectant or equivalent product.
8. Portable Ceiling Access Module.

E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.

F. A dust control program will be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to Resident Engineer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

G. Medical center Infection Control personnel will monitor for airborne disease (e.g., aspergillosis) during construction. A baseline of conditions will 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 with safe thresholds established.

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

1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
3. Adhesive Walk-off/Carpet Walk-off Mats 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.
4. 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 it is created. Transport these outside the construction area in containers with tightly fitting lids.
5. 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.

6. 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.
7. 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.

I. 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.

J. Exterior Construction:

1. Contractor shall verify that dust will not be introduced into the Medical Center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.
2. Dust created from disturbance of soil such as from vehicle movement will be wetted with use of a water truck as necessary.
3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

**1.14 DISPOSAL AND RETENTION**

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

1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by Resident Engineer.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from the Medical Center.

3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. The Contractor is prohibited from using VA dumpsters. The Contractor shall furnish and pay for all dumpsters required to legally remove construction debris from the VA Medical Center.

**1.15 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS**

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site that are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer, at no additional cost.

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

**(FAR 52.236-9)**

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

**1.16 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 structural work, and do not disturb 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, 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, in condition acceptable to the Government. 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 damage caused by Contractor to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

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

**1.17 PHYSICAL DATA**

Not Applicable.

**1.18 PROFESSIONAL SURVEYING SERVICES**

Not Applicable.

**1.19 LAYOUT OF WORK**

Not Applicable.

**1.20 PROJECT RECORD DRAWINGS**

A. The Contractor shall maintain two (2) full size sets of project record drawings which he shall keep 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 ensure compliance, project record drawings shall

be made available for the Resident Engineer's review, as often as requested.

C. Contractor shall deliver two (2) approved completed sets of project record drawings to the Resident Engineer within fifteen (15) calendar days after the acceptance of the project by the Resident Engineer.

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

**1.21 USE OF ROADWAYS**

A. For hauling, use only established public roads and roads on the Medical Center property. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

**1.22 FIELD OFFICE**

Not Applicable.

**1.23 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:

1. Permission to use each unit or system must be given by Resident Engineer. If the equipment is not installed and maintained in accordance with the following provisions, the Resident Engineer will withdraw permission for use of the equipment.
2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems (i.e., transformers, relays, circuit breakers, fuses, conductors, motor controllers) and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.

6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.

B. Prior to final inspection, 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.

**1.24 TEMPORARY USE OF EXISTING ELEVATORS**

A. Contractor will not be allowed the use of existing elevators.

**1.25 TEMPORARY USE OF NEW ELEVATORS**

Not Applicable.

**1.26 TEMPORARY TOILETS**

A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Resident Engineer, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1. Portable toilets shall be provided by the Contractor at their expense. There is no access to toilets within the construction zone and no permitted access to toilets within other areas of the facility.

**1.27 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 Contractor shall carefully conserve utilities furnished without charge.

B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated paraphernalia.

C. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
   1. Obtain heat by connecting to the Medical Center heating distribution system.
      a. Steam is available at no cost to Contractor.
D. Electricity (for Construction and Testing): Furnish all temporary electric services.
   1. Obtain electricity by connecting to the Medical Center electrical distribution system. Electricity is available at no cost to the Contractor.
E. 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 the Medical Center's system.
F. Steam: Furnish steam system for testing 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.

**1.28 NEW TELEPHONE EQUIPMENT**

The contractor shall coordinate with the work of installation of telephone equipment by others. This work shall be completed before the building is turned over to VA.

**1.29 TESTS**

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

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

C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc.

D. All related components shall be functioning when 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 a component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

**1.30 INSTRUCTIONS**

A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and written instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy 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 written 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, instructor who, in the opinion of the Resident Engineer, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

**1.31 GOVERNMENT-FURNISHED EQUIPMENT**

A. The Government shall deliver to the Contractor, the Government-furnished equipment shown on the drawings and/or indicated in the specifications.

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

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

D. Notify Contracting Officer in writing, 60 days in advance, of date on which Contractor will be prepared to receive equipment furnished by Government. Arrangements will then be made by the Government for delivery of equipment.

1. Immediately upon delivery of equipment, Contractor shall arrange for a joint inspection thereof with a representative of the Government. At such time the Contractor shall acknowledge receipt of equipment described, make notations, and immediately furnish the Government representative with a written statement as to its condition or shortages.

2. Contractor thereafter is responsible for such equipment until such time as acceptance of contract work is made by the Government.

E. Equipment furnished by the Government will be delivered in a partially assembled (knock down) condition in accordance with existing standard commercial practices, complete with all fittings, fastenings, and appliances necessary for connections to respective services installed under contract. All fittings and appliances (i.e. couplings, ells, tees, nipples, piping, conduits, cables, and the like) necessary to make the connection between the Government furnished equipment item and the utility stub-up shall be furnished and installed by the contractor at no additional cost to the Government.

F. Completely assemble and install the Government furnished equipment in place ready for proper operation in accordance with specifications and drawings.

G. Furnish supervision of installation of equipment at construction site by qualified factory trained technicians regularly employed by the equipment manufacturer.

**1.32 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 other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

E. Contractor shall employ services of an installation specialist or engineer, who is an authorized representative of the manufacturer of this equipment to supervise assembly and installation of existing equipment, required to be relocated.

F. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

**1.33 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT**

Not Applicable.

**1.34 CONSTRUCTION SIGN**

A. Provide a Construction Sign where directed by the Resident Engineer.
B. Construction sign materials, dimensions, construction, text, and finishes shall be determined by the Resident Engineer.
C. Maintain sign and remove it when directed by the Resident Engineer.

**1.35 SAFETY SIGN**

A. Provide a Safety Sign where directed by Resident Engineer.
B. Safety sign materials, dimensions, construction, text, and finishes shall be determined by the Resident Engineer.
C. Maintain sign and remove it when directed by Resident Engineer.
D. Post the number of accident free days on a daily basis.

**1.36 PHOTOGRAPHIC DOCUMENTATION**

Not Applicable.

**1.37 FINAL ELEVATION DIGITAL IMAGES**

Not Applicable.

**1.38 HISTORIC PRESERVATION**

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

**1.39 VA TRIRIGA CPMS**

VA contractors, selected by award to perform work, are required to get access to the VA TRIRIGA CPMS. The TRIRIGA CPMS is the management and collaborative environment that the VA uses for all Major, Minor and Non-Recurring Maintenance (NRM) projects within the Office of Construction & Facilities Management (CFM), Veterans Health Administration (VHA), National Cemetery Administration (NCA), and the Veterans Benefits Administration (VBA).

The contractor is solely responsible for acquiring access to the VA TRIRIGA CPMS.

To gain access to the VA TRIRIGA CPMS the contractor is encouraged to follow the licensing process outline as specified below:

A. Requirement: TRIRIGA is the management and collaborative environment that VA uses for all construction projects. VA requires its contractors to procure TRIRIGA access as part of the cost of performance for a VA construction related contract.

B. Access Request and Payment can be made through the following URL https://valicensing.oncfi.com/
Inquiries or to request additional services, contact the following:
Craig Alsheimer, Federal Account Manager
Computerized Facility Integrations, LLC
18000 West Nine Mile Road, Suite 700
Southfield, MI 48075
Email: calsheimer@gocfi.com
Phone: 248-557-4234 Extension 6010; 410-292-7006

C. Process:
1. Once the contractor has been notified by VA of the award and a unique contract number, the contractor can enter a request for access to TRIRIGA at URL https://valicensing.oncfi.com/
2. CFI will process the request for access and payment. CFI will create the USER ID and a password. Security provisions required to align the contractor to the Contract Number will be entered and an email will be generated and submitted to the requestor.
3. CFI will also provide standard terms and conditions related to the transaction and use agreement.

**1.40 ATTACHMENTS**

The following attachments form a part of and are inserted at the end of the Section. Contractor shall fill out required forms and submit them to the VA COTR.

1. ATTACHMENT 'A': Federal Register/Vol. 76, No. 106/Thursday, June 2, 2011/Notices, page 31998: Office of Personnel Management, Cancellation of an Optional Form by the Office of Personnel Management (1 page).
2. ATTACHMENT 'B': “New York Harbor ID Requirements as per Conference Call with Harbor Management” (1 page).
3. ATTACHMENT 'C': VHA Procurement and Logistics, Standard Operating Procedure, February 25, 2011 (19 pages) – Acquisition Security Requirements:
   PART I: Implementing VA Handbook 6500.6, Contract Security;
   PART II: Contractor Personnel Security and Suitability;
   PART III: Personal Identity Verification (PIV) of Contractors; and
   PART IV: Business Associate Agreements (BAA) for Contracts.
4. ATTACHMENT 'D': VHA Directive 2011-036, September 22, 2011 (11 pages) – Safety and Health During Construction. Directive expires September 30, 2016.
5. ATTACHMENT 'E': Contractor Security Check Form (1 page).

6. ATTACHMENT 'F': Fingerprint Record Prep Sheet (1 page).
7. ATTACHMENT 'G': HIPDB/NPDB (Health Integrity & Protection Data Bank/National Practitioner Data Bank) (1 page).
8. OBTAIN FROM VA - ATTACHMENT 'H': USCIS Form I-9, OMB No. 1615-0047, Expires 03/31/2016 (9 pages) – Instructions for Employment Eligibility Verification, Department of Homeland Security, U.S. Citizenship and Immigration Services.
9. OBTAIN FROM VA - ATTACHMENT 'I': Optional Form 306, Revised October 2011 (3 pages) – Declaration for Federal Employment* (*This form may also be used to assess fitness for federal contract employment); Form Approved: OMB No. 3206-0182.
10. OBTAIN FROM VA - ATTACHMENT 'J': VA Form 0711, Oct 2006 (RS) (3 pages) – Request for Personal Identity Verification Card; Form Approved: OMB No. 2900-0673.
11. ATTACHMENT 'K': 138-13, Interim Life Safety Measures (ILSM) Determination, February 2003 (revised 04/14/09).
12. ATTACHMENT ‘L’: 138-27, Construction & Infection Control Risk Assessment (ICRA) Determination, April 2009.
13. ATTACHMENT 'M': Coordination Drawing Checklist.
14. ATTACHMENT 'N': Daily Log – Construction.
15. ATTACHMENT 'O': Electric Panel Schedule.
16. ATTACHMENT 'P': Hot Work Permit – For Cutting, Welding, Soldering, Brazing With Portable Gas Or Arc Equipment.
17. ATTACHMENT 'Q': RFI – Request for Information
18. ATTACHMENT 'R': Construction Submittal – Status Log
19. ATTACHMENT 'S': Mechanical System Valve Chart.
20. ATTACHMENT 'T': Plumbing System Valve Chart.

- - - E N D - - -

## OFFICE OF PERSONNEL MANAGEMENT

### Cancellation of an Optional Form by the Office of Personnel Management

**AGENCY:** U.S. Office of Personnel Management.

**ACTION:** Notice.

**SUMMARY:** The U.S. Office of Personnel Management (OPM) is cancelling the Optional Application for Federal Employment. The information contained in the OF 612 is now incorporated in the online Resume Builder on the USAJOBS® Web site. The need to maintain the OF 612 as an alternative means of applying for Federal positions no longer exists as job seekers now have the ability to either build or upload resumes. This action is being taken to facilitate a more seamless employment application process for both Federal agencies and job seekers, consistent with the goals of Federal hiring reform.

**DATES:** Effective June 13, 2011.

**FOR FURTHER INFORMATION CONTACT:** U.S. Office of Personnel Management, Employment Services, USAJOBS, 1900 E. Street, NW., Washington, DC 20415, *Attention:* USAJOBS, or via electronic mail to *patricia.stevens@opm.gov.*

U.S. Office of Personnel Management.

**John Berry,**

*Director.*

[FR Doc. 2011–13704 Filed 6–1–11; 8:45 am]

**BILLING CODE 6325–38–P**

## OFFICE OF PERSONNEL MANAGEMENT

### Federal Employees Health Benefits Program: Medically Underserved Areas for 2012

**AGENCY:** U.S. Office of Personnel Management.

**ACTION:** Notice.

**SUMMARY:** The U.S. Office of Personnel Management (OPM) has completed its annual determination of the States that qualify as Medically Underserved Areas under the Federal Employees Health Benefits (FEHB) Program for calendar year 2012. This is necessary to comply with a provision of the FEHB law that mandates special consideration for enrollees of certain FEHB plans who receive covered health services in States with critical shortages of primary care physicians. Accordingly, for calendar year 2012, the following 15 states are considered as Medically Underserved Areas under the FEHB Program: Alabama, Alaska, Arizona, Idaho, Illinois, Kentucky, Louisiana, Mississippi, Missouri, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, and Wyoming. South Carolina is designated as a Medically Underserved Area in 2011, but will not be so designated for 2012. Alaska is being added as a Medically Underserved Area for the 2012 calendar year.

**DATES:** *Effective Date:* January 1, 2012.

**FOR FURTHER INFORMATION CONTACT:** Lynelle T. Frye, 202–606–0004.

**SUPPLEMENTARY INFORMATION:** FEHB law (5 U.S.C. 8902(m)(2)) requires special consideration for enrollees of certain FEHB plans who receive covered health services in States with critical shortages of primary care physicians. This section of the law requires that a State be designated as a Medically Underserved Area if 25 percent or more of the population lives in an area designated by the Department of Health and Human Services (HHS) as a primary medical care manpower shortage area. Such States are designated as Medically Underserved Areas for purposes of the FEHB Program, and the law requires non-HMO FEHB plans to reimburse beneficiaries, subject to their contract terms, for covered services obtained from any licensed provider in these States.

FEHB regulations (5 CFR 890.701) require OPM to make an annual determination of the States that qualify as Medically Underserved Areas for the next calendar year by comparing the latest HHS State-by-State population counts on primary medical care manpower shortage areas with U.S. Census figures on State resident populations.

U.S. Office of Personnel Management.

**John Berry,**

*Director..*

[FR Doc. 2011–13695 Filed 6–1–11; 8:45 am]

**BILLING CODE 6325–63–P**

## OFFICE OF PERSONNEL MANAGEMENT

### Posting of Service Contract Inventory

**AGENCY:** Office of Personnel Management.

**ACTION:** Notice of posting.

**SUMMARY:** The Office of Personnel Management has posted on its public Web site an inventory of the services contracts exceeding $25,000 that were awarded by the agency in Fiscal Year (FY) 2010. The inventory was prepared in accordance with Section 743 of Division C of the FY 2010 Consolidated Appropriations Act, Public Law 111–117, and with a Memorandum from the Office of Federal Procurement Policy dated November 5, 2010. It consists of two parts: (1) A complete listing of all contracts; and (2) A summary by Product or Service Code to show the use of contractors to perform "special interest functions" as well as the services that accounted for the agency's greatest percentage of spend in FY 2010. Both parts of the inventory can be found at: *http://www.opm.gov/doingbusiness/contract/businessops.aspx.*

**FOR FURTHER INFORMATION CONTACT:** William N. Patterson, Director, Contracting Group, Facilities, Security and Contracting, Office of Personnel Management, 1900 E Street, NW., Room 1342, Washington, DC 20415. Phone (202) 606–1984 or e-mail at *William.Patterson@opm.gov.*

U.S. Office of Personnel Management.

**John Berry,**

*Director.*

[FR Doc. 2011–13696 Filed 6–1–11; 8:45 am]

**BILLING CODE 6325–45–P**

## SECURITIES AND EXCHANGE COMMISSION

**[Release No. 34–64552; File No. SR–NASDAQ–2011–070]**

### Self-Regulatory Organizations; The NASDAQ Stock Market LLC; Notice of Filing and Immediate Effectiveness of Proposed Rule Change To Modify the Functionality of the Post-Only Order

May 26, 2011.

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 ("Act"),[1] and Rule 19b–4 thereunder,[2] notice is hereby given that on May 19, 2011, The NASDAQ Stock Market LLC (the "Exchange" or "NASDAQ") filed with the Securities and Exchange Commission ("Commission") the proposed rule change as described in Items I and II below, which Items have been prepared by the Exchange. The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

#### I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

The Exchange is filing this proposed rule change to modify the functionality of its Post-Only Order. NASDAQ proposes to implement the rule change thirty days after the date of filing or as soon thereafter as practicable. The text of the proposed rule change is available

[1] 15 U.S.C. 78s(b)(1).

[2] 17 CFR 240.19b–4.

**NEW YORK HARBOR ID REQUIREMENTS AS PER CONFERENCE CALL WITH HARBOR MANAGEMENT**

1) **VISITORS PASS** – Issued to contractor employees whose presence on site will NOT be more than one (1) day for the duration of the entire contract, contractor employee must provide:
    1) One (1) government issued and current photo ID.
    2) OSHA training 10/30.

    ID is issued by VA Police.

2) **NON-PIIV CARD** – Issued to contractor employees whose presence on site will be anywhere from two (2) days and above of the entire contract, contractor employee must provide:
    3) Two (2) government issued and current photo ID's.
    4) VA - 0711.
    5) OF-306
    6) I-9
    7) HIPDB NPDB
    8) FINGERPRINT RECORD PREP SHEET
    9) ~~**TB test**~~.**Deleted**
    10) OSHA training 10/30.
    11) Privacy and Information Security Awareness and Rules of Behavior training completion certificate.
    12) Privacy and HIPAA training completion certificate.
    13) Must be finger imaged.

    ID is issued by VA Police.

**Standard Operating Procedure**

# ACQUISITION SECURITY REQUIREMENTS: PART I: IMPLEMENTING VA HANDBOOK 6500.6, CONTRACT SECURITY, PART II: CONTRACTOR PERSONNEL SECURITY AND SUITABILITY PART III: PERSONAL IDENTITY VERIFICATION (PIV) OF CONTRACTORS; AND PART IV: BUSINESS ASSOCIATE AGREEMENTS (BAA) FOR CONTRACTS

**Purpose:** This Standard Operating Procedure (SOP) provides procedures for the Contracting Officer Technical Representative (COTR), the Contracting Officer (CO) or VA employee with acquisitions responsibilities to follow with regards to security language, identifying what classification of contract workers require a security screening; Personnel Identity Verification (PIV) Credentials; and/or background investigation to perform work for the Veterans Health Administration (VHA). For the purpose of this SOP and in accordance with VA security references, the Executive Director for the Office of Acquisition, Logistics and Construction re-delegates oversight responsibility for background investigations to the Assistant Secretary for Policy and Planning, Office of Security and Law Enforcement. This SOP establishes the following:

1) Standardized processes for the implementation of VA Handbook 6500.6, Contract Security.
2) Centralized Security Office Index (SOI) for electronic for Special Agreement Checks (SAC) or commonly referred to as "fingerprint submissions" for all VHA Office of Procurement and Logistics Contract Awards.
3) Centralized Program Office for the Special Agreement Check (SAC) Adjudications and Suitability Determinations: Communicating results directly with the Contracting Officer (CO) on issues related to Suitability Determinations and recommendations for appropriate Agency response.
4) Centralized Program Office (VHA Service Center, Seven Hills) for SAC Report. Standardizing the Homeland Security Presidential Directive-12 report, and eliminating the individual VISN submission. Information from the VISN level will be gathered and reported quarterly to this Program Office for a standardized VHA Office of Procurement and Logistics - SAC report.
5) Utilization of the Position Designation Automated Tool (PDAT) within VHA Office of Procurement and Logistics which assigns the appropriate risk and sensitivity level to applicable new and existing contractor and subcontractor personnel and contract employees providing services to VA.
6) Emphasis and effort during the post-award phase of the contract award: Post-award review creates opportunity to address the VA's security concerns between the contractor and agency, re-establish security requirements on behalf of the agency, and provides new and existing contractor and subcontractor personnel providing services to VA instructions for using VA's web-based background tracking system.
7) VA contractor training requirements and the process of documenting required VA training for contractor and subcontractor personnel.
8) Basic tractable timelines for establishing the start date for the period of performance notice.
9) Establishes the time frames for processing security requirements and oversight with enforcement during the procurement process.

Frederick Downs, Jr.
Chief Procurement and Logistics Officer (10F)
Veterans Health Administration
VA Central Office
Washington, DC 20420

## PART I – IMPLEMENTING VA HANDBOOK 6500.6 CONTRACT SECURITY

**Purpose:** Part I establishes the Standard Operating Procedures for implementing VA Handbook 6500.6, Contract Security, throughout VHA.

**Policy:** VA Handbook 6500.6, Contract Security establishes the security requirements, procedures, responsibilities and departmental framework for ensuring that security is included in appropriate VA contracts and acquisitions.

**Procedures:**

1. **Acquisition Planning (Pre-Solicitation) Phase:**

   a. **Checklist for Information Security ("Appendix A"):** During the planning (pre-solicitation) phase of the acquisition process, the Contracting Officer (CO), Privacy Officer (PO), Information Security Officer (ISO), Contracting Officer's Technical Representative (COTR) and other applicable staff, such as Program or Project Managers and Information System Owners, shall ***jointly*** complete the Checklist for Information Security in Appendix A of VA Handbook 6500.6, Contract Security. The checklist must be completed for ***ALL*** acquisitions and ***ALL*** applicable questions on the checklist ***must*** be answered. Please note, if the acquisition or purchase is ONLY for commodities or goods (e.g., equipment and software that does NOT require installation or maintenance as part of the contract) and the clause is therefore NOT required, then the **REQUESTER** may sign page A-6 and submit it to the CO when submitting the procurement request.

   In order to facilitate the discussion for completing the Checklist for Information Security in Handbook 6500.6, Appendix A, it is highly recommended that the team follow the flow chart and cross walk developed by VA OIT located on the following website: https://vaww.infoprotection.va.gov/policy/default.aspx.

   The completed checklist shall be loaded into the Pre-solicitation Documents (Funding Action) briefcase in eCMS.

   The CO, PO, ISO and COTR shall also consult the Deputy Under Secretary for Health for Operations and Management (10N) Memorandum dated May 18, 2010, VAAR Security Clause in Contracts, for guidance related to specific VHA health care contracts.

   b. **VA Information and Information System Security/Privacy Language ("Appendix C"):** If the completed checklist indicates that the appropriate security/privacy language outlined in Appendix C must be incorporated into the solicitation, the CO, ISO, PO, COTR and other applicable staff must ***jointly*** review Appendix C to determine which language is applicable and should be inserted into the solicitation as well as what the appropriate values are for any fill-ins in the selected language.

   c. **Consensus on Security Clause and Language:** The CO, PO, COTR and ISO must be in complete agreement on all answers from Appendix A as well as what language from Appendix C should be included in the solicitation. If the CO, PO, COTR and ISO cannot reach an agreement prior to issuance of the solicitation, such as whether or not the security clause should be included, the CO should contact their supervisor and coordinate a discussion with OGC and an ISO superior for guidance.

   d. **VA Handbook 6500 Waiver/Compensating Control Approval:** When a contractor refuses to sign a contract, delivery/task order, or modification request due to the inclusion of VAAR 852.273-75, Security Requirements for Unclassified Information Technology Resources (Interim – October 2008), the procedures outlined in the Office of Cyber and Information

Security (OCS) Standard Operating Procedure (SOP), VA Handbook 6500, Waiver/Compensating Control Approval, can be followed **IF** the issue at hand is a security compensating control item. Further information regarding the OCS VA 6500 Waiver Process is available at https://vaww.infoprotection.va.gov/policy/VA_6500_Waiver.aspx. The ISO takes the lead on the OCS Waiver/Compensating Control Approval process. The OCS Waiver/Compensating Control Approval package does NOT get routed through VHA Office of Procurement and Logistics or the SAO's office. It is purely an OIT process. Please note, if the VAAR clause 852.273-75 (Security Requirements for Unclassified Information Technology Resources) is determined necessary, the clause shall be included unless a National agreement with the contractor, OIT and OGC has been reached. The remedies process allows for the waiver of particular security controls and is NOT a waiver of the clause. The remedies process approves the waiver of a security process control, i.e. if co-mingling of contractor and VA data cannot be resolved; the waiver request addresses what security control processes can and cannot be implemented. The clause still applies.

2. **Solicitation Phase:**

   a. **VA Acquisition Regulation Solicitation Provision and Contract Clause ("Appendix B"):** If the completed checklist indicates that VAAR 852.273-75 should be included in the solicitation, the CO shall insert the clause into the solicitation using the eCMS clause library. The eCMS clause library will have the most recent version of the clause available.

   b. **VA Information and Information System Security/Privacy Language ("Appendix C"):** If the completed checklist indicates that the appropriate security/privacy language outlined in Appendix C must be incorporated into the solicitation, the CO shall insert the ***tailored*** language using eCMS in **Section C** (Contract Clauses, Terms and Conditions) of the solicitation directly following VAAR 853.373-75.

3. **Contract Administration (Post-Award) Phase:**

   a. Upon award, the CO shall provide the contractor with the "Notice of Award" letter (Attachment A), which provides further instructions for completing training and a copy of the contractor rules of behavior (i.e., how to get access to training, who to send the signed rules of behavior to, etc.).

   b. When the training certificates and signed rules of behavior are received, the CO shall load copies into the eCMS Award Action briefcase.

## PART II – CONTRACTOR PERSONNEL SECURITY AND SUITABILITY (BACKGROUND INVESTIGATIONS AND SPECIAL AGREEMENT CHECKS)

**Purpose:** Part II provides the procedures for determining contractor position risk and sensitivity levels, determining what level of background investigation is required and/or whether or not a Special Agreement Check (SAC) is required. Part II also describes the steps for initiating background investigations and SAC and provides templates for "Notice of Award" letters.

**Policy:** VA Directive 0710 and VA Handbook 0710 establish policies and procedures for the VA Personnel Security and Suitability Program including designation of position risk and sensitivity levels and corresponding background investigation levels and requiring reciprocity when applicable.

VHA Directive 0710 established a requirement that contract personnel who are exempt from the requirement in VA Directive 0710 to have a background investigation completed ***and*** who provide direct and/or ancillary health care services at VA facilities or have access to VA information systems or sensitive information must have a background screening, known as a SAC or fingerprinting, completed prior to entry on duty. VHA Handbook 0710.01 defines the procedures for implementing the policies established in VHA Directive 0710.

The Deputy Under Secretary for Health for Operations and Management (10N) Memorandum dated February 8, 2007, Contractors Excepted from Background Investigation and Screenings, provides clarification on which low risk or non-sensitive contractor positions do not meet the requirements for background investigation or background screening (SAC).

**Procedures:**

1. **Acquisition Planning (Pre-Solicitation) Phase:**

   a. **Position Designation System and Automated Tool (PDAT):** All VHA offices shall use PDAT for designating position risk and sensitivity levels and the corresponding level of background investigation (or background screening) for ***all*** contractor positions. The Contracting Officer (CO) and the Contracting Officer's Technical Representative (COTR) shall use PDAT to appropriately designate the statement of work (or other written description of the work to be completed) with the proper risk or sensitivity level and corresponding level of background investigation required for the contract employees. Information Security Officers should be consulted when access to VA Information systems and data is involved to ensure appropriate risk levels are assigned to contractors. The PDAT summary report must be completed and provided to the contracting activity before the procurement process can begin. The Contracting Officer shall load the PDAT summary report into the "Pre-solicitation Documents" (Funding Action) briefcase in eCMS.

   The risk level designations for public trust positions and the corresponding background investigation levels, as defined in VA Directive 0710, are:

| Public Trust Risk Level Designation | Background Investigation Level |
|---|---|
| High Risk | Background Investigation (high public trust: e.g., access to mission critical data or patients) (BI). |
| Moderate Risk | Minimum Background Investigation (moderate levels of public trust: e.g., access to facilities or sensitive data) (MBI) |
| Low Risk | National Agency Check with Written Inquiries (NACI) |

b. **Exemptions from Background Investigations:** Upon completion of the PDAT, the CO and COTR shall determine whether an exemption to the background investigation requirement applies. VA Directive 0710 specifies that the Office of Personnel Management (OPM) has exempted the following positions from investigative requirements:

   i. Low Risk/Nonsensitive positions that are temporary, intermittent, per diem, or seasonal not to exceed an aggregate of 180 days in either a single continuous appointment or series of appointments;
   ii. Positions filled by aliens outside the United States;
   iii. Consultants or experts appointed to Low Risk/Nonsensitive positions for a period of one year or less and not to be reappointed; and experts or consultants appointed for a period of more than one year or reappointed after a year with no break in service, provided the service does not exceed more than 30 days in any one calendar year;
   iv. Physicians appointed under 38 U.S.C. 7406 to Low Risk/Nonsensitive positions as medical residents, provided they do not exceed one year of continuous service at a VA facility, regardless of the duration of the residency program;
   v. Purchase and hire employees appointed to Low Risk/Nonsensitive positions appointed for six months or less;
   vi. Contract personnel assigned to Low Risk/Nonsensitive positions for 180 days or less under a single contract or series of contracts.

c. **Special Agreement Check (SAC) Requirements and Exemptions:** If it is determined that an exemption to a background investigation applies, the CO and COTR shall determine whether or not a SAC is required. All contract personnel who are exempt from a background investigation and who provide direct and/or ancillary health care services at VA facilities or have access to VA information systems or sensitive information must have a SAC completed unless an exemption applies. The Deputy Under Secretary for Health for Operations and Management (10N) Memorandum dated May 18, 2010, VAAR Security Clause in Contracts, specifies that the following low risk or non-sensitive contractor positions are exempt from the requirement to have a background screening (SAC):

   i. Contract personnel not accessing VA information resources such as personnel hired to maintain the medical facility grounds, construction contractors, utility system contractors, etc.
   ii. Contract personnel with limited and intermittent access to equipment connected to facility networks where limited Personal Health Information (PHI) is available, including contractors who install, maintain and repair network building equipment such as fire alarm, heating ventilating and air conditioning equipment, elevator control systems, etc.
   iii. Contract personnel with limited and intermittent access to equipment connected to facility networks where limited PHI may reside, including medical equipment contractors who install, maintain and repair networked medical equipment such as CT Scanners, EKG Systems, ICU monitoring, etc. In this situation, medical facilities must have a VA Business Associate Agreement (see Section III of this SOP) with the vendor to assure compliance with the requirements of the Privacy Act of 1974 and Health Insurance Portability and Accountability Act of 1996.

   ***NOTE:*** Contract personnel that are exempt from a background investigation but are required to have a SAC completed may require more than a SAC if they are required to obtain a Personal Identity Verification (PIV) card (see Part III of this SOP for more information).

2. **Solicitation Phase:**

   a. The CO shall insert the following language into solicitations for contracts that require a background investigation or SAC. The language shall be tailored accordingly:

      **Background Investigations and Special Agreement Checks**

      All contractor employees are subject to the same level of investigation as VA employees who have access to VA Sensitive Information. The level of background investigation commensurate with the level of access needed to perform the statement of work is: _____. This requirement is applicable to all subcontractor personnel requiring the same access.

      The contractor shall bear the expense of obtaining background investigations. If the investigation is conducted by the Office of Personnel Management (OPM) through the VA, the contractor shall reimburse the VA within 30 days.

3. **Contract Administration (Post-Award) Phase:**

   a. **Notice of Award:** Upon award, the CO shall provide the contractor with a "Notice of Award" letter (Attachment B), which shall contain detailed instructions on fulfilling security requirements.

   b. **Steps to Initiate Special Agreement Check (SAC):**

      i. The COTR is responsible for coordinating finger printing requirements with the designated VHA Office (either the facility's Human Resource (HR) Services or Security Services). The COTR shall inform the Contractor of the scheduled SAC appointment, the location, and who their point of contact shall be. It is recommended that the COTR escort the Contractor during the SAC appointment.

      ii. The designated VHA Office (HR or Security Services) submits the SAC electronically to the Office of Personnel Management (OPM). All VHA Security Office Index (SOI) Numbers shall be submitted as: VA08 for central billing purposes.

      iii. OPM sends the results of the SAC to the VHA Service Center (VSC) within 5 days. The VSC Security Office reviews the results and makes an adjudication recommendation to the CO within 10 days. Final suitability adjudication of the results must be determined by both the CO and the COTR. This determination is then documented and filed within the eCMS Contract Briefcase (Award Action). In cases where unfavorable SAC determinations are rendered and a contractor is denied access to VA property, the Network Contract Manager will be notified and a final review and determination shall be made whether to remove the Contractor from the project or terminate the contract.

      iv. Encrypted e-mail notifications will be sent to the Service Area Office (SAO), Compliance Office for immediate review in matters concerning unfavorable SAC determinations for contracted personnel. Appeals and final review will occur with the *VHA Procurement and Logistics Project Office Personnel Security Team.* All SAC determinations shall be documented and imported into eCMS.

## PART III – PERSONAL IDENTITY VERIFICATION (PIV) OF CONTRACTORS

**Purpose:** The purpose of this SOP is to establish a procedure for ensuring contractors obtain PIV cards when necessary as well as establish a centralized office for all VHA PIV card sponsorship.

**Policy:** Homeland Security Presidential Directive (HSPD-12), Policy for a Common Identification Standard for Federal Employees and Contractors, dated August 27, 2004, mandates that Federal employees and contractors be issued a standard and reliable form of identification that complies with the technical and procedural requirements defined in Federal Information Processing Standards Publication (FIPS) 201, Personal Identity Verification (PIV) of federal employees and contractors, dated February 25, 2005, as amended by FIPS 201-1, dated March 2006.

Office of Personnel Management Memorandum, Final Credentialing Standards for Issuing Personal Identity Verification Cards under HSPD-12, dated July 31, 2008, provides final government-wide credentialing standards to be used by all departments and agencies in determining whether to issue or revoke personal identity verification cards to their employees and contractor personnel.

VA Directive 0735, Personal Identity Verification of Federal Employees and Contractors, in conjunction with VA Handbook 0735, is to provide guidance regarding usage, administration, and governance for the VA Personal Identity Identification (PIV) card as well as providing guidance regarding identification cards for short-term employees, contractors and visitors. **Note:** VA Directive 0735 and VA Handbook 0735 are currently in draft form and this SOP will be updated once they have been finalized.

**Procedures:**

1. **Acquisition Planning (Pre-Solicitation) Phase:**

   a. **Determining Access Requirements:** There are three types of identification cards that can be issued to contractors: PIV Card, Non-PIV Card and Flash Badge. The determining factor as to the type of card issued is an examination of a contractor's access requirements for physical and/or logical VA resources. During the acquisition planning phase, the Contracting Officer (CO) together with the Contracting Officer's Technical Representative (COTR) and/or Program Managers shall determine which type of identification card the contract employees working on a specific contract will need and compare the level of background investigation required for the identification card with the level of background investigation determined in Part I of the SOP. Whichever results in the higher level of background investigation is the level the contractor employee shall receive. The following information describes the criteria for each type of identification card.

      i. **PIV Card:**

      Access Requirements: Unsupervised, full-time, logical and/or physical access for more than 6 months OR more than 180 aggregate days in a one year period
      ID Requirements: Two IDs compliant with PIV Guidelines
      Background Investigation Requirements: Favorable SAC adjudication and an initiated National Agency Check with Written Inquiries (NACI).

      ii. **Non-PIV Card:**

      Access Requirements: Unsupervised, logical and/or physical access for less than 6 months OR less than 180 aggregate days in a one year period
      ID Requirements: Two IDs compliant with PIV Guidelines
      Background Investigation Requirements: Favorable SAC adjudication

iii. **Flash Badge:**

Access Requirements: Common physical access ONLY for less than 6 months OR less than 180 aggregate days in a one year period
ID Requirements: One ID compliant with PIV Guidelines
Background Investigation Requirements: None

2. **Solicitation Phase:**

   a. In accordance with FAR 4.1303, the CO shall use eCMS to insert the clause 52.204-9, Personal Identity Verification of Contractor Personnel, in solicitations and contracts when contract performance requires contractors to have routine physical access to a Federally-controlled facility and/or routine access to a Federally-controlled information system. The clause shall not be used when contractors require only intermittent access to Federally-controlled facilities.

3. **Contract Administration (Post-Award) Phase:**

   a. Upon award, the CO shall provide the contractor with a “Notice of Award” letter (Attachment B), which shall contain detailed instructions on fulfilling security requirements.

## PART III - BUSINESS ASSOCIATE AGREEMENTS

**Procedures**: The following guidance and processes shall be used by all acquisition and procurement staff in the management of Business Associate Agreements (BAA).

1. As part of procurement initiation process, the program office/using service will ensure the requirement is reviewed by the Privacy Officer. The Privacy Officer will review all requirements to determine the necessity to incorporate a BAA as part of the contract/purchase order/agreement. As part of the procurement package, Appendix A in accordance with VA Directive 6500.6 will be signed by the Information Security Officer (ISO), Privacy Officer (PO), Contracting Officer's Technical Representative (COTR), Program Manager (if applicable), and Contracting Officer (CO).

2. If the PO determines a BAA is required based on the work required under the contract/purchase order/agreement, the CO/Purchasing Agent (PA) will perform the following:

    a. Ensure the latest version of the BAA is incorporated into the solicitation. The template is located at http://vaww4.va.gov/hia/BAA.html.
    b. Prior to award, the CO will search the National Business Associate Agreement website http://vaww4.va.gov/hia/BAA.html to verify if a National BAA exists for the apparent awardee.
    c. If there **is** an active national BAA, the CO will ensure the existing agreement is incorporated into the resultant contract/purchase order/agreement.
    d. If **no** national BAA exists, the CO will obtain the required reviews in accordance with IL 001AL-09-02.
    e. The BAA will be reported to the central tracking database as required below.
    f. If there is a dispute between the CO/PA and PO, follow the process outlined in Section C.

B. Mandatory Tracking of Business Associate Agreements

1. Upon execution of a Business Associate Agreement, the Network Contract Activity will enter the information into the central tracking database located on the VHA DCPO SharePoint site: http://vaww.teamshare.va.gov/PCLO/AWI/default.aspx.
2. The VHA Operations Office will be responsible for running monthly reports to determine if duplicative local BAAs with the same vendor has been executed across VHA.
3. The list shall be provided to the VHA Health Information Access (HIA) Office, which manages National Level BAAs, for a determination if a national BAA would be appropriate.
4. If a BAA is executed, the HIA Office will notify the VHA Operations Office so this information can be disseminated through the Service Area Offices and the Network Contract Activities.

C. Dispute Escalation Plan between the Privacy Officer and Contracting Official

1. For complex BAA issues or in the event of a dispute between the CO/PA and the PO whether a BAA applies or does not apply, the HIA BAA Program Manager will be contacted for assistance. A request will be generated and submitted via email to james.gwyn@va.gov for assistance and/or clarification.

2. The HIA Office will provide their response via email and the response shall be uploaded into the official eCMS file.

3. **Responsible Office:** The Executive Director for Office of Acquisition, Logistics and Construction is responsible for the material contained in this Standard Operating Procedure.

D. Liquidated Damages

1. The CO will ensure a Liquidated Damages (LD) clause is included in all contracts that require a Business Associate Agreement.
2. The LD assessment will be $37.50 per day, per individual. This figure will be assessed annually by VA Office of General Counsel (OGC).

**References:**

a. VA Handbook 6500.6 of March 12, 2010; *Contract Security*

b. VA Notice 09-02 of March 24.2009; *Positions Designation Automated Tool (PDAT)*

*c.* Deputy Under Secretary for Health for Operations and Management (10N) Memorandum dated February 8, 2007; *Contractors Excepted from Background Investigation and Screenings*

d. IS-15 of July 2008; *Requesting OPM Personnel Investigations*

e. Deputy Assistant Secretary for Acquisitions and Materiel Management Policies and Regulations – IL–90–01–6; Contractor Personnel Security Requirements

*f.* Homeland Security Presidential Directive -12 *(HSPD-12)*

*g.* Federal Investigations Notice, July 31, 2008 *Final Credentialing Standards for Issuing Personal Identification Verification Cards under HSPD-12.*

h. Federal Acquisitions Regulations, 48 C.F.R. Parts 39 and 52

*i.* VA Directive 0710 dated June 4, 2010; *Personnel Suitability and Security Program*

j. VA Handbook 0710 dated September 10, 2004; *Personnel Suitability and Security Program*

*k.* VA Notice 06-6 dated December 18, 2006; *Procedures for Initiating Background Investigators for Contractors*

Attachment A:

**NOTICE OF AWARD**

[Date]

[Contractor Name
Address]

**Subject:** Award of [insert contract/task order number and title]

Congratulations! This letter confirms award of the subject [insert one: contract or task order] to [insert contractor name] in response to solicitation [insert solicitation number]. Please review and sign the enclosed SF-1449 and return it to the Contracting Officer no later than [insert time and date].

Please note that all of the following items must be completed by each contract employee, including any subcontract employees, prior to commencing work. ***The Contracting Officer will return a countersigned and fully executed copy of the SF-1449 when all of the following items are completed. The countersigned SF-1449 serves as the notice that work can commence.***

1. **STEP ONE: Complete Background Investigation Request Worksheet:** Within five business days of receiving this letter, the contractor shall submit a completed **Background Investigation Request Worksheet (Form #1)** that lists ***all*** contractor employees who will be working on the [insert one: contract or task order] to the VHA Service Center (VSC) Personnel Security Office via password protected or encrypted e-mail to VSCSecurity@va.gov or fax to (216) 447-8020. ***Note:*** due to the personal information contained in the Background Investigation Request Worksheet, the information must be sent in a secure manner. Please **DO NOT** e-mail a document containing social security number unless the e-mail is encrypted.

   Within five business days of receiving the Background Investigation Request Worksheet, the VSC Personnel Security Office will enter a background investigation request into the VA Security Investigation Center (SIC) Contractor Request Database (CRD) for each contractor employee. When the request is entered, an automated "initial" e-mail is sent to the contractor point of contact listed on the Background Investigation Request Worksheet. The automated e-mail identifies the background investigation level requested and provides a website link with further instructions.

   If a contractor employee has a background investigation from another federal agency, it may be reciprocated as long as the background investigation meets the appropriate level designated in the current statement of work and has occurred within the last five years with a favorable adjudication and no break in service. Please be aware that any public trust case that is older than two years and does **not** have a favorable adjudication cannot be reciprocated unless it was a no issue case.

VSC Personnel Security Office staff will coordinate with the VA Security and Investigations Center (SIC) staff to verify reciprocity. If the contractor employee receives the automated e-mail from the VA SIC CRD and believes he/she may be eligible for reciprocity, please contact the VA SIC using the contact information in the e-mail. Reciprocity is **NOT** automatic. If a background investigation can be reciprocated, the VA SIC will send an e-mail notification to the contractor.

**Note:** As contract personnel are added to the contract or order, the Background Investigation Request Worksheet must be updated and submitted to the VSC Personnel Security Office so that a background investigation can be initiated. The additional contract employee cannot start work until all security requirements listed in this letter are completed.

2. **STEP TWO: Complete Special Agreement Check (SAC) (Fingerprinting):** ALL contractor employees are required to be fingerprinted within 14 calendar days of this notice, except for those who received an e-mail from the VA SIC confirming reciprocity. Courtesy electronic fingerprints can be obtained at some VA facilities. Please contact the Contracting Officer's Technical Representative (COTR) to schedule a fingerprinting appointment at a VA facility as soon as possible. Each contractor employee shall take a copy of the **VHA Special Agreement Check (SAC) Memorandum (Form #2)** to the fingerprinting appointment and complete it. Completed forms shall be faxed to the VSC Personnel Security Office at (216) 447-8020 the same day the contractor employee is fingerprinted.

   OPM sends the results of the SAC to the VSC Personnel Security Office within 5 days. The VSC Personnel Security Office reviews the results and makes an adjudication recommendation to the CO within 10 days, who will inform the Contractor POC of the outcome.

3. **STEP THREE: Complete and Submit Background Investigation Documents:** Upon receipt of the automated e-mail from the VA SIC CRD (see Step One), each contractor employee who did not receive a reciprocation notice, must complete and submit the required documents to the VA SIC **within five business days**. The submission address will be provided in the automated e-mail. Do not send completed documents to the VA SIC before being fingerprinted or before receiving the initial automated e-mail – THE DOCUMENTS WILL BE RETURNED.

   The VA SIC reviews the documents within seven business days for completion and accuracy. If the documents do not contain any errors, the VA SIC forwards them to the Office of Personnel Management (OPM) to conduct the background investigation. If the documents contain errors, the VA SIC will return them to the contractor with corrective instructions. The corrections must be made immediately and sent back to the VA SIC. Once the documents are completed correctly and VA SIC forwards them to OPM, an automated e-mail is sent to the contractor point of contact stating that the background investigation has been ***initiated***.

   On the 20th day, if the VA SIC has not received a completed package, the Contractor POC will receive an e-mail notification that the request is still pending and has not been initiated.

On the 40th day, if the VA SIC has not received a completed package, the Contractor POC will receive an email stating that the request has been terminated and the contractor employee must be replaced due to non-compliance with security requirements and a new background investigation request will need to be submitted.

4. **STEP FOUR: Obtain Personal Identity Verification (PIV) Card (Security Badge):** Each contractor employee is required to obtain a PIV Card. In order to be eligible to receive a PIV Card, the contractor employee must have both a favorable SAC completion and an initiated background investigation (or reciprocation). **Within five business days** of reciprocation or receiving notice of initiated background investigation and favorable SAC adjudication, the contractor employee must complete the **VHA Service Center Contractor PIV Sponsorship Form (Form #3)** and submit it to the VSC Personnel Security Office via e-mail at VSCSecurity@va.gov or fax it to (216) 447-8020.

5. **STEP FIVE: Complete Required Training and Sign Contractor Rules of Behavior:** All contractor employees shall complete the training indicated in the solicitation. The contractor shall ***provide copies of training certificates and signed Contractor Rules of Behavior for each employee within five business days of reciprocation or receiving notice of initiated background investigation and favorable SAC adjudication contractor and annually thereafter*** to the Contracting Officer and the COTR. In order to obtain access to the VA training via the VA's Learning Management System (LMS), please contact the COTR.

Should you have any questions, contact _____.

Sincerely,

Contracting Officer

## CONTRACTOR SECURITY PROCEDURE FLOWCHART

Contractor receives Notice of Award letter from contracting officer.

Five Business Days

**STEP ONE:** Complete and submit Background Investigation Request Worksheet (Form #1)
*and*
**STEP TWO:** Complete Special Agreement Check (Fingerprinting) and submit VHA Special Agreement Check (SAC) Memorandum (Form #2)

Five Business Days

Contractor POC receives an automated "initial" e-mail from VA SIC for each contract employee listed on the Background Investigation Request Worksheet with a website link that provides further instructions. If a contract employee has a previously completed background investigation, he/she may be eligible for reciprocity. Do any contract employees have previously completed background investigations?

NO

YES

Contractor POC should contact VA SIC indicating which employees may be eligible for reciprocation. Reciprocity will be verified by the VA SIC. If it can be reciprocated, an e-mail notification will be sent to the Contractor POC.

NO

**STEP THREE:** Upon receipt of the automated "initial" e-mail, each contract employee must complete and submit background investigation documents <u>within five business days</u>.

Seven Business Days

Upon receipt of background investigation documents, the VA SIC reviews them for accuracy. If the package is correct and complete, the package is forwarded to OPM and the Contractor POC receives an automated e-mail indicating that the background investigation has been initiated. Has the VA SIC notified the contractor that a background investigation has been initiated?

YES

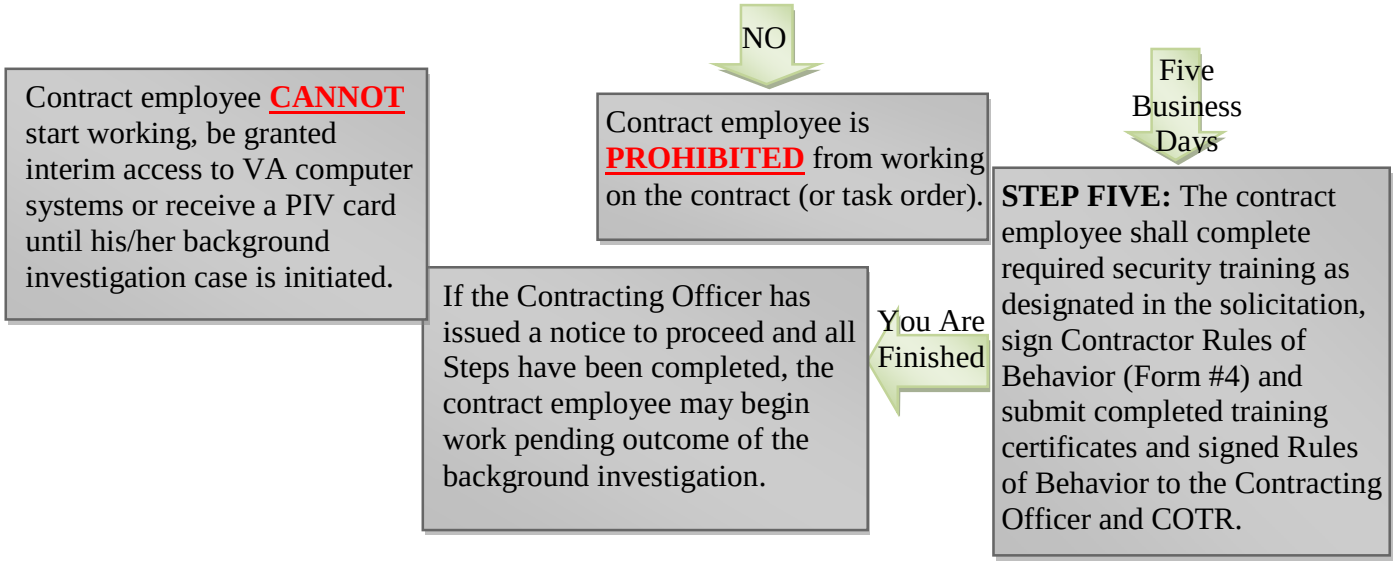
While the background investigation process is being completed, the VSC Personnel Security Office reviews the results of the Special Agreement Check (fingerprints) and makes an adjudication recommendation to the Contracting Officer, who will inform the contractor POC of the outcome. Did the contract employee receive a favorable adjudication?

YES

YES

**STEP FOUR:** Each contract employee shall complete and submit the VHA Service Center Contractor PIV Sponsorship Form (Form #3) and make an appointment to obtain a PIV card. This shall be completed <u>within five business days</u> of reciprocation *or* receiving notice of initiated background investigation **and** favorable SAC adjudication

NO


NO
Contract employee is PROHIBITED from working on the contract (or task order).
Five Business Days
STEP FIVE: The contract employee shall complete required security training as designated in the solicitation, sign Contractor Rules of Behavior (Form #4) and submit completed training certificates and signed Rules of Behavior to the Contracting Officer and COTR.
You Are Finished
If the Contracting Officer has issued a notice to proceed and all Steps have been completed, the contract employee may begin work pending outcome of the background investigation.
Contract employee CANNOT start working, be granted interim access to VA computer systems or receive a PIV card until his/her background investigation case is initiated.

**Department of Veterans Affairs**
**VHA Service Center**
**6100 Oak Tree Blvd #500**
**Independence, OH 44131**
**216-447-8010**

# Background Investigation Request Worksheet

**The Contractor is responsible for updating the background investigation form as personnel are added to the order. The Contractor must submit the updated form to the Contracting Officer within five business days of the date to begin work.**

## Contractor Information

Contracting Officer/Contracting Specialist: _____

Telephone: _____

Station/VISN Number: _____

SAO Region (**East/Central/West):** _____

Purchase Order Number: _____

Risk Level (Low/Medium/High): _____

Contractor Name (Sub in parentheses): _____

Prime Contractor POC Name & Phone: _____

Prime Contractor POC Email: _____

Prime Contractor Address: _____

## Contractor Employee Information

**(Date and Place of Birth are required to cross check clearances issued by other departments/agencies.)**

| Employee Name | SSN | Employee Home Address | D.O.B. | Place of Birth | Previous Investigations Yes/No/Date |
|---|---|---|---|---|---|
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**Form #1**

**Department of Veterans Affairs**
**VHA Service Center**
**6100 Oak Tree Blvd #500**
**Independence, OH 44131**
**216-447-8010**

# VHA Service Center Contractor PIV Sponsorship Form

## Employee Information

Name (First Middle Last): _____

Social Security Number: _____

Date of Birth (MM/DD/YYYY): _____ Gender (M/F): _____

Race: _____

Eye Color: _____

Hair Color: _____

Height & Weight: _____

Citizenship: (US, Naturalized or Non-Citizen Status) _____

Place of Birth (City, State, Country): _____

Home Address: _____

_____

Job Title: _____

Contractor Company Name: _____

Company Address: _____

_____

**Form #2**

Security SOP
Original Date: 2/25/11

**Department of Veterans Affairs**
**VHA Service Center**
**6100 Oak Tree Blvd #500**
**Independence, OH 44131**
**216-447-8010**

# VHA Special Agreement Checks (SAC) Memorandum

**FINGERPRINTS MUST BE COMPLETED WITHIN FIVE (5) BUSINESS DAYS AFTER NOTICE OF AWARD**

## Employee Information (please print)

Name (First Middle Last): _____

Social Security Number: _____

Contractor (yes/no): _____

## VA Security Specialist Use Only

**SON: 955C / SOI: VA08**

Federal Agency Name: _____

VISN Number: _____

Station Number: _____

Date Fingerprinted: _____

Method of Fingerprinting: **Electronically**

**After fingerprints are captured, fax this completed document to:**
**VHA Service Center (VSC)**
**Personnel Security Office**
**Fax# 216-447-8020**

**Form #3**

Security SOP
Original Date: 2/25/11

**Department of Veterans Affairs**
**VHA Service Center**
**6100 Oak Tree Blvd #500**
**Independence, OH 44131**
**216-447-8010**

# VHA Security Center PIV Credentials Turn-In Inventory Report

**(attach additional sheets as required)**

## Contractor Information

Contractor POC Name & Phone: _____

## Contractor Employee Information

| Employee Name | Company Name | VA Turn-In Location | Turn-In Date |
|---|---|---|---|
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Site Manager/COTR Signature & Date: _____

Site Manager/COTR Name (printed): _____

**Form #4**

Security SOP
Original Date: 2/25/11

**Department of Veterans Affairs** **VHA DIRECTIVE 2011-036**
**Veterans Health Administration**
**Washington, DC 20420** **September 22, 2011**

# SAFETY AND HEALTH DURING CONSTRUCTION

**1. PURPOSE:** This Veterans Health Administration (VHA) Directive establishes policy for maintaining a safe and healthy worksite for staff, volunteers, visitors, contractors, and the general public during construction and renovation-related activities. This policy applies to all construction activities as defined by Occupational Safety and Health Administration (OSHA) that are performed at VHA owned or leased facilities regardless of whether performed by VHA or contractor staff.

## 2. BACKGROUND

a. OSHA Title 29 Code of Federal Regulations (CFR) Part 1926, The Joint Commission (TJC) and National Fire Protection Association (NFPA) standards identify requirements for safe construction practices. Environmental Protection Agency (EPA) regulations address safety requirements related to specific environmental issues (e.g., asbestos, lead, etc.). The Federal Acquisition Regulation (FAR) and Veterans Affairs Acquisition Regulation (VAAR) address contractor safety and Department of Veterans Affairs (VA) oversight requirements.

b. The implementation of a proactive and comprehensive construction safety program reduces the potential for injury and illness from unsafe and unhealthy construction activities. Construction safety programs reduce the potential for VHA liability that could result from construction-related accidents, injuries or exposures.

c. **Definitions**

(1) **Competent Person (CP).** OSHA defines a CP as one who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

(2) **Construction.** OSHA defines construction as alteration or repair, including painting and decorating of a large scale or high-complexity. For further clarification of the definition of construction please refer to OSHA's letters of interpretation (see subpar. 5s).

(3) **Construction Lead Person**. The construction lead person is typically the contractor's foreperson or superintendent, or the VHA foreperson or engineering supervisor. However, it could be any other individual assigned to lead and direct a work crew operation. This person acts as the OSHA CP responsible for monitoring the construction site for hazards and implementing corrective actions.

(4) **Construction Safety Officer (CSO).** The CSO identifies worksite risk and coordinates risk reduction activities through the Contracting Officer (CO) or the Contracting Officers

Technical Representative (COTR), collects deficiency information, and disseminates summaries of action and results (TJC standards, construction risks in physical environment). This individual satisfies the VAAR 852.236-87 (see subpar. 5p) requirement to have a Safety Officer to monitor and enforce Contractor compliance with FAR 52.236-13 (see subpar. 4r).

(5) **High-Severity Serious-Construction (HSCS) Accidents.** HSCS accidents include fatalities and permanently disabling injuries or illnesses. This includes amputations, crushing with loss of use of body part, third to fifth degree burns or scalds, loss of sight, and respiratory illnesses. HSCS accidents include near misses that could result in fatalities or permanently disabling injuries or illnesses.

(6) **Interim Life Safety Measures (ILSM).** ILSM is a series of eleven administrative actions to temporarily mitigate National Fire Protection Association 101 2000 Life Safety Code deficiencies or construction activities (TJC standards) (see Standards Sec. EC 5.5).

(7) **Maintenance.** The term "maintenance" refers to applied trades work on a structure, fixture, foundation or other building systems to ensure a safe and functional condition.

**3. POLICY:** It is VHA policy that construction and renovation activities on VHA-owned property and VHA-leased property be conducted in such a way as to protect the health and safety of VHA and contractor staff, patients, and the public.

**4. ACTION**

a. **Under Secretary for Health**. The Under Secretary for Health ensures that a national policy covering construction safety at VHA facilities is issued.

b. **Deputy Under Secretary for Health for Operations and Management.** The Deputy Under Secretary for Health for Operations and Management is responsible for issuing program guidance and policy related to construction safety at VHA facilities.

c. **Director, Office of Construction and Facilities Management (00CFM).** The Director, Office of Construction and Facilities Management (00CFM), is responsible for:

(1) Developing construction guides, specifications and contract documents that specifically address safety requirements for construction projects. Specifications and project designs must reflect OSHA, NFPA, EPA, VA, and TJC requirements, and other recognized standards of safety that apply to the construction industry.

(2) Providing design documents for construction projects to appropriate VA, Veterans Integrated Service Network (VISN) and VA medical center staff for review.

(3) Ensuring Resident Engineers (RE) complete the OSHA 30-hour Construction Safety training course and a minimum 10 hours of construction safety refresher training every 2 years. The construction safety training must be documented in the RE's training record.

(4) Ensuring REs comply with the established Resident Engineer Handbook (see subpar.5q), VAAR 852.236 (see subpar. 5p), and FAR 52.236.13.

(5) Ensuring that on-site general and sub-contractor's construction workers have completed the OSHA 10 hour Construction Safety training, 30 hour Construction Safety course, and other relevant competency training.

d. **Director, Safety, Health and Environmental Compliance.** The Director, Occupational Safety and Health, Environmental, and Emergency Management is responsible for:

(1) Providing professional construction safety guidance in the recognition, evaluation, and control of construction hazards that comply with OSHA regulations, TJC accreditation requirements, and VA policy.

(2) Developing and implementing construction safety goals and initiatives for the protection of staff, patients, visitors, contractors, and the public while on VHA-owned and VHA-leased properties.

(3) Monitoring and evaluating VHA's construction safety program to ensure the reduction of construction work-related injuries and illnesses.

(4) Evaluating HSCS construction accidents to determine causal factors, developing control measures, and identifying lessons learned.

(5) Providing construction safety expertise to the Employee Education System (EES) in the development of Construction Safety training materials for VHA staff.

e. **Director, VHA Office of Healthcare Engineering**. The Director, Office of Healthcare Engineering is responsible for:

(1) Providing engineering support to VHA and VA Departments for the mitigation of construction hazards and risks.

(2) Communicating hazard alerts to health care engineers at VA-owned and VA-leased facilities.

(3) Conducting, at VHA senior management's request, incident-related site investigations and report analysis.

f. **Director, Infectious Disease Program.** The Director, Infectious Disease Program is responsible for:

(1) Advising and providing recommendations on exposure mitigation and prevention of facility-associated infections for patients, staff, and visitors.

(2) Providing information and advice to VHA on infectious diseases associated with construction.

(3) Advising or providing recommendations on protective practices to be employed during construction that reduce the risk of infection.

g. **Director, Occupational Health, Strategic Health Care Group, Office of Public Health.** The Director, Occupational Health, Strategic Healthcare Group is responsible for providing consulting services to VHA, 00CFM, and the Office of Asset and Enterprise Management (OAEM) staff on occupational health issues related to construction activities.

h. **Chief Officer, VHA Procurement and Logistics Office.** The Chief Officer, VHA Procurement and Logistics Office, is responsible for ensuring that contracts and related documents for construction and enhanced-use leased projects, include language that requires the work performed adheres to the requirements of this Directive.

i. **Director, Office of Enterprise Operations and Field Development within The Office of Information and Technology (OI&T).** The Director, Office of Enterprise Operations and Field Development, OI&T, is responsible for ensuring that contracts and related documents for construction and enhanced-use leased projects include language that mandates adherence to the requirements of this Directive.

j. **Veterans Integrated Service Network (VISN) Director.** Each VISN Director is responsible for ensuring that:

(1) VHA policies for construction safety programs at VHA facilities are implemented.

(2) The effectiveness of facility construction safety management program is monitored as a part of the Annual Workplace Evaluations (AWE) using the Safety Automated Facility Evaluation (SAFE) program.

(3) All VISN Safety and Health Program Managers and staff that have responsibilities related to construction complete a 30-hour OSHA Construction Safety training and, as a refresher, subsequently complete at least 10 hours of construction safety-related training every 2 years. The construction safety training must be documented in their training record.

k. **VHA Facility Director.** The VHA Facility Director is responsible for:

(1) Establishing and monitoring an effective facility construction safety program using a construction safety committee chaired by a member of management, or designee, composed of a Multi-disciplinary Team with representatives from the following program areas: Infection Control, Patient Safety, Occupational Safety and Health, VA Police, Engineering (Facilities Management), Engineering (Project Management), Green Environmental Management System (GEMS), Emergency Planning, Local Union Representatives, Employee Occupational Health, CSO, and Contracting.

(2) Ensuring that the Multi-disciplinary Team oversees:

(a) Protection of patients, visitors, and employees from injury and illness, as well as occupational and nosocomial infections related to construction activities.

(b) Compliance with Federal and state EPA and OSHA regulations.

(c) Compliance with FAR and VAAR in addressing a contractor's construction safety program.

(3) Developing and implementing a written policy addressing the responsibilities of the Multi-disciplinary Team and establishment of a Construction Safety Committee or subcommittee.

(4) Ensuring that the following VA staff complete OSHA's 30-hour Construction Safety training and, as a refresher, subsequently complete at least 10 hours of construction safety related training every 2 years:

(a) VHA Chief Engineers, COTR's Project Engineers, and Project Lead Persons;

(b) All members of the Multi-disciplinary Team; and

(c) CSO's and Facility Safety Program Managers.

l. **Multi-disciplinary Team**. The Multi-disciplinary Team is responsible for:

(1) Determining the scope and depth of safety, infection control, emergency management, and security responsibilities as appropriate for all construction work.

(2) Confirming compliance with applicable regulations, standards, and policies during the construction phase of the work.

(3) Conducting a pre-construction risk assessment to assess all hazards that affect health care, treatment, and services.

(a) Staff must conduct and document in writing pre-construction risk assessments during the design or planning stage of the construction project and or renovation. Pre-construction risk assessments need to be conducted prior to bidding, award, and starting work.

(b) Pre-construction risk assessments must focus on eliminating, or minimizing, the aforementioned risks during construction and renovation activities.

(4) ~~**Conducting a pre-construction risk assessment for the transmission of Tuberculosis (TB) to the contracted construction workers based upon the construction site location, patient population, hospital layout, and the defined risk as outlined in the "CDC Guidelines for preventing the transmission of Mycobacterium Tuberculosis in Health-Care Setting, 2005" (see subpar. 5v).**~~

(5) Ensuring ILSMs are assessed and implemented on all construction work according to TJC standards. ILSMs are required when Life Safety Code deficiencies or construction activities pose significant hazards as determined by the assessment.

(6) Participating in all phases of construction work from planning through completion. This includes review and approval of construction plans, contract specifications, contract submittals related to construction safety and health, and any other documents that may assist in the implementation of an effective construction safety program. The Multi-disciplinary Team must be involved early in the process and continue oversight on a regular basis.

(7) Ensuring the Construction Safety Program includes periodic construction site hazard surveillance activities with appropriate membership, scope, and frequency for each project as determined by the CSO and the pre-construction risk assessment. Weekly surveillance activities are required with reports or checklists submitted to the CSO. In some cases daily inspections may be required by the CSA (e.g., construction activities capable of a HSCS accident).

***NOTE:*** *Hazard Surveillance reports document non-compliant activities by daily inspection (minimum) until corrected as determined by the CSO. Reports include date, time, and members of the inspection team, deficiencies, type of corrective action, and time and date of correction. Hazard surveillance activities must be documented and tracked to completion.*

(8) Acting as members of the Construction Safety Committee or subcommittee and meeting at least monthly.

(9) Ensuring that documentation of the Team's inspections is provided to the CO or COTR, RE, and the VISN Safety and Health Staff, as requested.

m. **Facility VHA Chief Engineer.** The facility Chief Engineer is responsible for:

(1) Working with contractor and VHA facility staff to coordinate and monitor an effective construction safety program for projects under their direction.

(2) Acting as the Safety Officer in accordance with VAAR 836.236-87 and ensuring contractors comply with VA safety and health policies and procedures, and contract requirements.

(3) Serving on the facility Construction Safety Committee, or subcommittee, to ensure contracts meet the committee's requirements.

(4) Supporting the CSO, Facility Safety Manager, CO, and engineering staff in implementing the construction safety program.

n. **Contracting Officer (CO) and Contracting Officer's Technical Representative (COTR) or Project Engineer.** The CO and COTR or Project Engineer are responsible for:

(1) Ensuring that all solicitations and the clause found in VAAR 836.236-87.

(2) Designating, through a letter of delegation, the COTR, CSO, Chief Engineer, or Safety Program Manager to serve as the Safety Officer for VHA contracts.

(3) Adding subparagraph (f) of FAR 52.236-13, to the contract language, if the contract involves:

(a) Work of a long duration or hazardous nature; or

(b) Performance of a construction or renovation project on a Government facility that, on the advice of CO, COTR, or CSO involves hazardous materials or operations that might endanger the safety of the general public or Government personnel or property.

(4) Ensuring that all contracts and associated documents specify that all onsite contracted construction workers have completed the OSHA 10 hour Construction Safety training or the 30 hour Construction Safety training, and other relevant competency training, as determined by the COTR or CSO in coordination with the Multi-disciplinary Team. The determination for other relevant competency training is based on the project hazards and complexity, Federal and state regulations, and VA requirements.

(5) Ensuring that all projects require contractor verification of the completion of required training.

(6) Ensuring submittals for contract construction or renovation work to include the names, qualifications, and training dates for the contractor CP designated to administer the site-specific safety program, as well as the CP for other activities as required by OSHA regulation.

(7) Evaluating and considering past safety records of prospective contractors in awarding contracts. At a minimum, ensuring that all solicitations and contracts require documentation, to be supplied by potential contractors, that specifies the contractor in question has no more than three serious, or one repeat, or one willful OSHA or EPA violation(s) in the past 3 years and has an Experience Modification Rate (EMR) of equal to or less than 1.0.

(8) Serving on the facility Construction Safety Committee, or subcommittee, to ensure contracts meet the Committee's requirements.

(9) ~~**Ensuring that if contracted construction worker(s) have been determined to be at risk for transmission of TB to them based upon the TB pre-construction risk assessment,**~~

~~**(a) Then, the contractor must provide written certification that all contract employees assigned to the work site have had a pre-placement tuberculin screening within 90 days prior to assignment to the worksite and been found have negative TB screening reactions. Contractors will be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site.**~~

~~***NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step skin testing or a Food and Drug Administration (FDA) approved blood test (see subpars. 5t and 5u).***~~

~~**(b) Contract employees manifesting positive screening reactions to the tuberculin must be examined according to current CDC guidelines prior to working on VHA property.**~~

~~**(c) Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician must be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.**~~

~~**(d) If the employee is found with evidence of active (infectious) pulmonary TB, the employee would require treatment with a subsequent statement to the fact on file with the employer before being allowed to return to work on VHA property.**~~

o. **Construction Safety Officer (CSO).** CSO responsibilities include project submittal reviews of all construction projects and:

(1) Identifies work site risks.

(2) Collects deficiency information.

(3) Disseminates actions and results.

(4) Provides oversight of contract construction safety, and is knowledgeable in the general inspection of typical work sites during construction and renovation performed by contract staff, and in the review of contractor safety program submittals.

***NOTE:*** *CSO(s) do not take the place of the contractor's CP or act on their behalf.*

(5) Determines if the contractor is meeting VA standards and contractual requirements for safety and OSHA compliance (Acting as the Safety Officer in accordance VAAR 836.236-87). When these standards and contract requirements are not being met, the VA COTR or CO, in coordination with the CSO must take immediate action to prevent injury, exposure, noncompliance, or property damage.

(6) Requires the contractor CP to implement and maintain an effective safety program that identifies and controls hazards that may cause injury or illness to VA patients, staff, visitors, and contractor employees; this includes:

(a) Ensures that the specific safety requirements for construction operations are implemented during facility projects.

(b) Participates in the VHA facility Multi-disciplinary Team established for the construction safety committee.

(c) Conducts periodic inspections of VHA construction sites to ensure compliance with safety elements of the established program(s), at a minimum weekly inspections are required.

***NOTE:*** *REs are the Safety Officers for OOCFM managed construction sites and any associated inspections. Be aware that the TJC requires protection of all who enter VHA properties, and as such RE construction sites factor into accreditation.*

p. **GEMS Coordinator.** The GEMS Coordinator is responsible for providing guidance on EPA regulations that directly and immediately relate to the impacts that the project may have on the environment during the design or construction stage of the project.

q. **Emergency Planning Coordinator.** The Emergency Planning Coordinator is responsible for providing guidance on OSHA regulations as they apply to emergency planning, response, and operations in construction (e.g., 29 CFR 1926.35 and 29 CFR 1926.65).

r. **Construction Lead Person.** The construction lead person (VHA Engineering Supervisors, VHA Forepersons, Contractor's Superintendent, Contractor's Forepersons, and other assigned lead persons) is responsible for:

(1) Administering the site-specific construction safety program as the OSHA defined CP.
***NOTE:*** *Inspections by CPs are required in accordance 29 CFR Part 1926.*

(2) Acting as the CP for other activities as required by OSHA regulations; including, but not limited to scaffolds, cranes, and excavations.

s. **Police and Security Officers.** The police and security officers are responsible for:

(1) Ensuring all contractors entering VHA properties comply with the Security Management Program. As a minimum, contractors must notify and obtain permission from the VA Police, be identified by project and employer, and be restricted from unauthorized areas.

(2) Providing consultation to the CSO, COTR, or other responsible staff in periodic surveillance of site security and the integrity of barriers to the construction site.

t. **Intervention Authority and Compliance.** CSO, authorized COs (or other personnel responsible through delegation of authority by the CO) with defined actions in this Directive are responsible for intervening whenever conditions, as a result of construction activities, immediately threaten life or health or threaten to damage equipment or buildings. Intervention authority and compliance with this Directive and the associated regulatory requirements are as follows:

(1) **Staff.** All staff are responsible for identifying hazardous conditions in need of intervention and for developing a culture of safety. Identified hazardous conditions must be communicated either orally or in a written format to authorized COs (or other personnel responsible through delegation of authority by the CO) who must take prompt corrective measures to include immediate abatement of hazards, stopping of work, hazard awareness training, administrative controls, etc.

(2) **Contractors.** Authorized COs (or other personnel responsible through delegation of authority by the CO) must notify the contractor both orally and in written forms of communication requesting

immediate initiation of corrective action of any hazards identified. After receiving the notice the contractor must immediately take corrective action.

(a) If the Contractor fails or refuses to promptly take corrective action, the CO may issue an order stopping all, or part, of the work until satisfactory corrective action has been taken (FAR 52.236-13).

(b) Upon a repeat offense of the same or substantially similar hazard, the CO, in coordination with the COTR or CSO, needs to follow the processes for the termination of the contract, if the situation is not resolved using the process outlined in FAR 36.513. The CO exclusively or in collaboration with other personnel responsible through delegation of authority by the CO is responsible for enforcement of the contract.

(c) The CSO with assistance from the COTR and the Multi-disciplinary Team is responsible for making the Contractor and CO formally aware of any hazard in need of correction.

## 5. REFERENCES

a. VHA Emerging Pathogens Guidebook, 1998, Center for Engineering and Occupational Safety and Health available electronically at: http://vaww.ceosh.med.va.gov/01HP/02HP_Guidebooks/03_Collections/04HP_EmergingPathogens/PDFContents/Ep.pdf . ***NOTE:*** *This is an internal Web site and is not available to the public.*

b. NFPA Codes and Standards, available at: http://vaww.ceosh.med.va.gov/01FS/pages/NFPAWarning.shtml . ***NOTE:*** *This is an internal Web site and is not available to the public.*

c. APIC Infection Control Tool Kit Series: Construction and Renovation, available from the Association of Professional Infection Control Practitioners and Epidemiologists.

d. Guidelines for Design and Construction of Hospital and Health Care Facilities, Facility Guidelines Institute 2010.

e. Guidelines on Assessment and Remediation of Fungi in Indoor Environments, New York City Dept. of Health, Bureau of Environmental and Occupational Disease Epidemiology, the website is: http://www.nyc.gov/html/doh/html/epi/moldrpt1.html.

f. Infection Control During Construction. A Guide to Prevention and JCAHO Compliance, Wayne Hansen, Editor, Opus Communications, 2002.

g. OSHA Regulations for Construction Safety, 29 CFR 1926, available at: http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=Construction

h. U.S. Environmental Protection Agency Regulations, available at: http://www.epa.gov/lawsregs/bizsector/construction.html

i. Current Standards from The Joint Commission available at: http://vaww.archive.oqp.med.va.gov/oqp_services/accreditation/jcaho.asp . ***NOTE:*** *This is an internal Web site and is not available to the public.*

j. VHA Directive 7701, Occupational Safety and Health. http://vaww1.va.gov/vhapublications/ViewPublication.asp?pub_ID=240 . ***NOTE:*** *This is an internal Web site and is not available to the public.*

k. VHA Handbook 7701.01, Occupational Safety and Health Program Procedures. http://vaww1.va.gov/vhapublications/ViewPublication.asp?pub_ID=2282 . ***NOTE:*** *This is an internal Web site and is not available to the public.*

l. VA Directive 7700, Occupational Safety and Health. http://vaww1.va.gov/VASAFETY/SignedandDatedfinalSeventySevenHundred.pdf

m. Construction Safety Council, available at: http://www.buildsafe.org/.

n. U.S. CDC guidelines, available at: http://www.cdc.gov/niosh/docs/2004-146/ch4/ch4-2.asp.htm

o. Federal Acquisition Regulation, available at: http://www.acquisition.gov/far/

p. Veterans Affairs Acquisition Regulation, available at: http://www.va.gov/oamm/oa/ars/policyreg/vaar/vaar852.cfm

q. Veterans Affairs Resident Engineer Handbook available at: http://vaww.cfm.va.gov/RE/ . ***NOTE:*** *This is an internal Web site and is not available to the public.*

r. Veterans Affairs Project Manager Handbook available at: http://vaww.cfm.va.gov/RE/ ***NOTE:*** *This is an internal Web site and is not available to the public.*

**6. FOLLOW-UP RESPONSIBILITY:** The Deputy Under Secretary for Health for Operations and Management (10N) is responsible for VHA programs related to this Directive. The point of contact for technical and program issues related to this Directive is the Director, Occupational Safety and Health, Environmental, and Emergency Management (10NA8) at (202) 266-4547.

**7. RECISSIONS:** VHA Directive 2004-012, dated April 5, 2004, is rescinded. This VHA Directive expires September 30, 2016.

Robert A. Petzel, M.D.
Under Secretary for Health

DISTRIBUTION: CO: E-mailed to VHA Publications Distribution List on 9/27/2011

VA NEW YORK/NEW JERSEY
VETERANS HEALTH CARE SYSTEM
NEW YORK HARBOR HEALTH CARE SYSTEM

# CONTRACTOR SECURITY CHECK FORM

| | | |
|---|---|---|
| **Contract Employee Name:** | **Station Number:** | **COTR Designee:** |
| | | |
| **Contract Employee SSN:** | **Contract Number** | |
| | | |
| **Position Title:** | **Service:** | |
| | | |

| | | |
|---|---|---|
| **DATE FINGERPRINTED:** | **DATE FINGERPRINT RESULTS:** | |
| | | |
| **HR/POLICE DETERMINATION:** | **ADJUDICATED BY:** | **DATE ADJUDICATED:** |
| | | |

**CODE KEY FOR FBI HITS:**

1. Favorable determination was made. (Generally a minor issue.) (Person was note contacted)
2. Favorable determination was made. (generally a minor issue, but potentially actionable.) (Person was contacted.)
3. Favorable determination was made. (No actionable issues found.)
4. Resigned, was terminated, or withdrew application prior to determination.
5. Not appointed based on suitability or security determination.
6. Remove, based on suitability or security determination.
7. Person counseled and/or letter of warning/advisement or reprimand issued.
8. Person retained, but security clearance revoked or denied.
9. Suspended for 14 days or less. (not likely to apply)
10. Suspended for 15 days or more. (not likely to apply)
11. Other action was taken. (Specify: _____)

# FINGERPRINT RECORD PREP SHEET

PLEASE PRINT CLEARLY

| | | | | | | |
|---|---|---|---|---|---|---|
| NAME (LAST, FIRST, MIDDLE) | | | | | | |
| SSN | | | | | | |
| DOB | YEAR: | | MONTH: | | DAY: | |
| ALIAS | | | | | | |
| SEX | | | | | | |
| RACE | | | | | | |
| EYE COLOR | | | | | | |
| HAIR COLOR | | | | | | |
| HEIGHT (FT/IN) | FEET: | | INCHES: | | | |
| WEIGHT (LBS) | | | | LBS | | |
| PLACE OF BIRTH (COUNTRY/STATE) | COUNTRY | | | STATE | | |
| CITIZENSHIP | | | | | | |
| SERVICES | | | | | | |
| POSITION/DUTY STATION | | | | | | |
| HOME ADDRESS | | STREET | | | | |
| | | CITY | STATE | | ZIP | |
| TELEPHONE | | ext. | | | | |

To be Completed by Human Resources:

STAFFER: _____

DATE PRINTED: _____

PRINTED BY: _____

**HIPDB / NPDB**

**(Health Integrity & Protection Data Bank/
National Practitioner Data Bank)**

**Male:** _____ **Female:** _____

**LAST NAME:** _____

**FIRST NAME:** _____

**BIRTH DATE:** _____

**HOME ADDRESS:** _____

_____

**SOCIAL SECURITY #:** _____

**SCHOOL(S) ATTENED:** _____

**YEAR OF GRADUATION:** _____

**STATE OF LICENSURE:** _____

**STATE LICENSE NUMBER:** _____

**SPECIALTY:** _____

**OCCUPATION:** _____

**Specialist:** _____ **Date:** _____

**SECTION 01 00 00**
**ATTACHMENT 'H'**

*Obtain the following document from the VA Contracting Officer:*

**USCIS Form I-9, OMB No. 1615-0047, Expires 03/31/2016 (9 pages) –**

**INSTRUCTIONS FOR EMPLOYMENT ELIGIBILITY VERIFICATION,**

**Department of Homeland Security,**

**U.S. Citizenship and Immigration Services**

**SECTION 01 00 00**
**ATTACHMENT 'I'**

*Obtain the following document from the VA Contracting Officer:*

**Optional Form 306, Revised October 2011 (3 pages) –**

**DECLARATION FOR FEDERAL EMPLOYMENT***

**(*This for may also be used to assess fitness for federal contract employment); Form Approved: OMB No. 3206-0182**

**SECTION 01 00 00**
**ATTACHMENT 'J'**

*Obtain the following document from the VA Contracting Officer:*

**VA Form 0711, Oct 2006 (RS) (3 pages) –**

**REQUEST FOR PERSONAL IDENTITY VERIFICATION CARD**

**Form Approved: OMB No. 2900-0673**

**DEPARTMENT OF VETERANS AFFAIRS**
**NEW YORK HARBOR**
**HEALTHCARE SYSTEM**

**HEALTHCARE SYSTEM POLICY NO:** 138-13
**SUBJECT:** INTERIM LIFE SAFETY MEASURES
**DATE:** February 2009 (revised 04/14/09)

## 1. PURPOSE

To establish policies and procedures to enhance the safety of the occupants in all patient care buildings at the VA New York Harbor Healthcare System (VANYHHS). These measures are to alleviate current safety deficiencies in the affected buildings by establishing measures that will increase the training, fire drills and safety inspections in these buildings. Interim Life Safety Measures (ILSM) are to be used during any construction projects or building/system alterations that affect life safety in patient occupied buildings.

## 2. POLICY

The VANYHHS will provide measures to assure that life safety equivalencies are provided in all patient care areas.

## 3. RESPONSIBILITIES:

a. The Chiefs, Engineering Services are responsible to ensure that an Interim Life Safety Program is developed and that the necessary actions to implement the program are in force.

b. The Project Engineer is responsible for evaluating the project for ILSM implementation. Project Engineers shall ensure that increased hazard surveillance of the project affected area to insure that large amounts of combustibles are not stored in the construction area.

c. Designated Safety Officers are responsible to ensure the following actions are taken:
   1. Increased hazard surveillance of all areas requiring ILSM.
   2. Increased removal of hazardous chemicals from the affected areas.
   3. Increased Staff awareness through training and the conducting of additional fire drills, (separate from and in addition to the regular scheduled fire drill requirements).
   4. Informing contractors of the Interim Life Safety Measures and enforcing the ILSM in the construction area.

d. The Chief, Environmental Management Service is responsible for increased and timely removal of trash throughout these areas. Particular attention will be directed to the central trash compacting / sanitizing areas, as well as the areas adjacent to trash removal elevators. There must be no accumulation of flammable / combustible rubbish in any areas, and corridors must be kept free and clear of rubbish accumulations at all times.

e. The Chief, Police Service is responsible for increased surveillance of all patient buildings to ensure that smoking policies are properly adhered to. Security will provide additional fire watch(s) when so advised by the Chief, Engineering Service.

f. Service Chiefs, Program Managers, and Department Heads are responsible for and must take action to ensure that there are no accumulations of combustible rubbish in any areas under their control. Services shall coordinate with Environmental Management Service when packing/unpacking large quantities of supplies so that packing materials may be removed in a timely manner.

## 4. PROCEDURES:

a. Project Engineers assigned to a specific project shall maintain a weekly construction area safety checklist to ensure that ILSM are implemented. Inspections of the work area will be conducted daily and any problems and deficiencies will be noted on the checklist along with any corrective action taken. Completed checklists shall be forwarded to the Chief Engineer for review and to the Safety Section for filing.

   Note: Construction areas are strictly off limits to all patients, visitors, and members of the public. Construction areas will be secured and locked during construction activities and when construction activities are finished for the day or shift. Construction areas are off limits to all personnel including consultants, residents, students, and other personnel without prior approval and coordination through Engineering Service. Doors on construction barriers shall have a self closing and self locking device to ensure authorized access is not obtained.

   1. When access to a construction area is unavoidable because major corridors that patients, visitors, and employees must utilize are within a construction area, Engineering Service will coordinate with all contractors to keep these areas and egress access clear and unobstructed. Warning signs will be posted in appropriate locations for patients, visitors, and employees. When construction relocates or makes a commonly used or familiar area, such as a restroom, inaccessible, notice signs shall be posted informing staff, patients, and visitors of the construction being performed. These signs must also clearly and precisely provide directions to the relocated area or an acceptable alternative. Prior to the start of the project, the Project Engineer will coordinate with other services for the removal of nonessential equipment and cover-up for dust protection. During the project, the contractor is responsible for maintaining the area with daily cleaning, or more often as necessary.

   2. The Project Engineer shall assure that all fire exits and means of egress are unobstructed. If this is not feasible, Safety personnel shall develop a revised Fire Exit Plan during the design of the project and post signs

during the project to indicate the changes. Means of egress shall be inspected daily and documented by the contractor through the Project Engineer. Documentation (Attachment #1) shall be placed in the project file. If alternate exits must be designated, the Safety Section will provide training to all staff in affected areas. Additionally, the Safety Officer will notify the Fire Department of any temporary blocking of exits and of alternate routes for egress. This will be documented in the project folder, and only done in rare instances.

3. The Project Engineer shall assure that all smoke and fire barriers are maintained for the duration of the project. If necessary, temporary barriers shall be constructed to assure compliance as per the National Fire Code.

4. The Project Engineer will assure that the prime contractor and their subcontractors are aware of and comply with this policy and VA Master Specification Section 01010, General Requirements, Paragraph 1.4 and Section 01001, General Conditions, paragraphs 1.53, 1.54, and 1.55. The Project Engineer will perform daily inspections of the worksite to assure all temporary measures are in place and operational while documenting in the daily progress notes.

5. The Fire and Safety Section shall conduct one additional fire drill per shift per quarter for staff in affected areas where interim life safety measures are utilized. During all drills the Occupational Safety and Health Section personnel will, in their post critique, provide information to assure organization awareness of any life safety deficiencies, construction hazards, and interim life safety measures.

6. Smoking is expressly prohibited in or adjacent to all construction areas. Smoking near the exterior areas shall be a minimum of 50 feet from flammable liquids, and a safe distance from other combustible materials.

7. The Safety Officer shall inform all affected employees of any hazards or ILSM's associated with any construction project. Additionally, a bulletin shall be published to inform all staff of these hazards.

8. The contractor shall assure that storage, debris removal, and proper housekeeping practices are in place and enforced to reduce the flammable and combustible fire load to the lowest extent possible with oversight by the Project Engineer.

9. Additional fire fighting equipment will be in place in the area when deemed necessary by the Safety Officer. Training shall be documented on any changes in fire suppression equipment.

b. The Safety Staff shall implement the following ILSM actions:

1. Increased fire safety training of affected personnel to ensure awareness of hazards and the staff response expected in an emergency.

2. Increased hazard inspections of all areas and documentation of deficiencies, along with corrective actions.

3. Increased fire drills. To be separate from, and in addition to, the regularly required fire drills.

   a) The Chief, Police Service shall arrange for increased surveillance by VA Police Officers of all patient buildings to enforce the no smoking regulations.
   b) The Chief, Environmental Management Service shall arrange for timely trash removal throughout the Healthcare system.

**5. REFERENCES**

- The Joint Commission Life Safety Standard LS.01.02.01
- VACO Fire Safety Management Guidebook
- VA 7700 Directive
- NFPA 101, Most Recent Edition

**6. RESCISSION:**

Healthcare System Policy No. 138-13, February 2006

**7. EXPIRATION DATE**

February 2012

JOHN J. DONNELLAN JR.
Director

Distribution: SC

**Attachment # 1**

# *Interim Life Safety measures (ILSM) Checklist*

**Project Title:** _____ **Project #** _____

## EFFECTS ON LIFE SAFETY:

Give a brief description of project and any know effects it will have on life safety (i.e. closing of one ground floor exit to outside from an enclosed stairwell; installation of a dust barrier; temporarily impair fire detection and/or suppression systems at time of connection or rearrangement of system; removal of patient room door; etc.)

_____

_____

_____

_____

_____

_____

## PLAN OF ACTION:

The following Interim Life Safety Measures will be implemented to compensate for the temporary hazards imposed during construction:

1. Ensuring exits provide unobstructed egress. Personnel shall receive training if alternate exits must be designated. Buildings or area under construction must maintain escape facilities for construction workers at all times. Means of egress in construction area must be inspected daily.

   Exits Obstructed? YES NO N/A If yes then:

   a. Personnel in building will receive training from the Safety Specialist on alternate routes and exits.
      Training Completed? YES NO Date completed: _____

   b. Construction areas will have designated and marked exits. Areas will be inspected daily by the Project Engineer to ensure that these exits are kept clear. Results will be recorded in the attached inspection log (See attachment #2)

2. Ensuring free and unobstructed access for emergency department vehicles or services and for emergency forces.

   a. The construction plans will be reviewed to ensure proper access will be maintained.
      Plans reviewed? YES NO N/A Date completed: _____

   b. Areas will be inspected daily by the Project Engineer to ensure access is kept clear. Results will be recorded in attached inspection log (See attachment #2).

3. Ensuring fire alarm, detection and suppression systems are not impaired. A temporary, but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly. Any impairment of systems will be noted on inspection sheet (See attachment #2).

   a. Contractor will be briefed to schedule work to minimize time systems are impaired and to notify Project Engineer prior to system being impaired.
      Brief Conducted? YES NO N/A Date completed: _____

4. Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire.

   a. Contractor will be briefed at preconstruction conference of requirement.
      Brief Conducted? YES NO N/A Date completed: _____

b. Areas will be inspected daily by the Project Engineer to ensure adequacy of construction partitions. Results will be recorded in the attached inspection log (See attachment #2).

5. Providing additional fire-fighting equipment and use training for personnel.

a. Contractor will be briefed at preconstruction conference of need to provide adequate fire fighting equipment and training to construction employees.
Brief Conducted? YES NO N/A Date completed: _____

6. Prohibiting smoking in or adjacent to all construction areas.

a. Areas will be inspected daily by the Project Engineers to ensure no smoking policy is being adhered to. Results will be recorded in the attached log (See attachment #2)

7. Developing and enforcing storage, housekeeping and debris removal practices that reduce the flammable and combustible fire load of the building to the lowest necessary level for daily operation.

a. Contractor will be briefed at preconstruction conference of requirement.
Brief Conducted? YES NO N/A Date completed: _____

b. Areas will be inspected daily by the Project Engineer for excessive construction debris. Results will be recorded in the attached inspection log (See attachment #2).

8. Conducting a minimum of two fire drills per shift per quarter. Project Engineers will coordinate with the Safety Specialist for evaluation.

a. Safety Specialist will evaluate effects of work on life safety and determine the necessity to increase fire drill frequency to two per shift per quarter for specific areas.
Frequency Increased? YES NO N/A Date completed: _____

Signed: _____ Date: _____
**Safety Officer**

9. Increasing hazard surveillance of building, grounds and equipment with special attention to excavations, construction areas, construction storage and field offices.

a. Areas will be inspected daily by the Project Engineer to identify hazards. Results will be recorded in attached inspection log (See attachment #2).

10. Training personnel when structural or compartmentation features of fire safety are compromised.

Features Compromised? YES NO N/A If Yes then:

a. Personnel in building will receive training from the Safety Specialist.
Training Completed? YES NO N/A Date completed: _____

11. Conducting organization-wide safety education programs to ensure awareness of any Life Safety Code deficiencies, construction hazards and these interim measures in affected areas.

a. Training Completed? YES NO N/A Date completed: _____

PLAN APPROVED BY: _____ _____
Safety Officer Date

**Attachment #2**

# *Interim Life Safety Measures*

| | | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Existing Significant Life Safety Code Deficiencies or Conditions as a Result of Construction** | **Ensuring Egress** | **Emergency forces access** | ***Emergency forces notification*** | **Ensuring operational life safety systems (Provide fire watch if necessary)** | **Temporary construction barriers** | **Additional fire fighting equipment** | **Conducting additional training of incident response team** | **Prohibiting smoking** | **Controlling combustible loading** | **Conducting 2 fire drills per shift in all areas** | **Increased hazard surveillance** | **Compartmentation training of personnel** | **Conducting organizational training on life safety** |
| 1 | Patient room door latching problem | | | | | | X | | X | X | | X | X | |
| 2 | Lacking a code complying smoke barrier | | | | | | X | X | X | | | X | X | |
| 3 | Fire exit stairs discharge improperly | | | X | | | | X | X | | X | | X | X |
| 4 | Excessive travel distance to an approved exit | | | | | | | | X | X | | X | X | |
| 5 | Lack of two remote exits | | | | | | | X | X | X | | X | X | |
| 6 | Nonconforming building construction type | | | | | | X | | X | X | X | X | | X |
| 7 | Improperly protected vertical openings | | | | | | | | X | X | X | X | X | |
| 8 | Large penetrations in fire/smoke barriers | | | | | | | X | X | X | | X | | |
| 9 | Corridor walls do not extend to the structure | | | | | | | | X | X | | X | X | |
| 10 | Hazardous areas not properly protected | | | | | | | | X | X | | X | | |
| 11 | Blocking off an approved exit | X | | X | | | | X | X | X | | X | X | |
| 12 | Rerouting of traffic to emergency room | | X | X | | | | | X | | | | | |
| 13 | Major renovation of an occupied floor | X | | | X | X | X | | X | X | | X | X | |
| 14 | Replacing fire alarm system (out-of-service) | | | X | X | | | X | X | X | X | X | | |
| 15 | Installing sprinkler system (out-of-service) | | | X | X | | X | | X | X | X | X | | X |
| 16 | Significantly modifying smoke or fire barrier walls | | | | | X | | | X | X | | X | X | |
| 17 | Adding an addition to an existing structure | X | X | X | X | X | | X | X | | | | | X |
| 18 | Taking a fire alarm system out-of-service | | | X | X | | | X | X | | | | | |
| 19 | Taking a sprinkler system out-of-service | | | X | X | | | X | X | | | | | |
| 20 | Disconnecting alarm devices | | | X | X | | | | X | | | | | |

**Attachment #3**

| | CONSTRUCTION AREA SAFETY CHECKLIST | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Project Title and No.: | | | | | | | | | |
| | Project Engineer: | | | | | | | | | |
| ***Inspection Date:*** | | | | | | | | | | |
| ***Items:*** | | | | | | | | | | |
| Smoke Barriers: Any holes? **(Y/N)** | | | | | | | | | | |
| Corridor Walls: Any holes? **(Y/N)** | | | | | | | | | | |
| Temporary Partitions: Fire rated and Smoke tight? **(Y/N)** | | | | | | | | | | |
| Fire alarm devices operational inspection | | | | | | | | | | |
| Pull stations? **(Y/N)** | | | | | | | | | | |
| Sprinkler system? **(Y/N)** | | | | | | | | | | |
| Smoke Detectors? **(Y/N)** | | | | | | | | | | |
| Temporary fire alarm system installed and tested? **(Y/N)** | | | | | | | | | | |
| | | | | | | | | | | |
| Unobstructed exits/egress (inspect daily) **(Y/N)** | | | | | | | | | | |
| Stair doors/patient doors positive latching? **(Y/N)** | | | | | | | | | | |
| "No Smoking" Policy enforced and inspected? **(Y/N)** | | | | | | | | | | |
| Combustible debris removed daily? **(Y/N)** | | | | | | | | | | |
| Unprotected or Unsecured hazards? **(Y/N)** | | | | | | | | | | |
| Remarks: | | | | | | | | | | |
| | | | | | | | | | | |
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# DEPARTMENT OF VETERANS AFFAIRS
# NEW YORK HARBOR
# HEALTHCARE SYSTEM

**HEALTHCARE SYSTEM POLICY NO: 138-27**
**SUBJECT:** CONSTRUCTION & INFECTION CONTROL RISK ASSESSMENT
**DATE:** April 2009

## 1. PURPOSE

To establish policies and procedures to ensure the Safety & Environment of Care in all patient care building is not compromised during any renovations or new construction. When planning demolition, construction or renovation work, the Engineering & Infection Control Safety Officer will conduct a proactive risk assessment using risk criteria to identify hazards that could potentially compromise patient care in occupied areas of the building. The risk criteria should address the impact of demolition, renovation or new construction activities have on Air Quality requirements, Infection Control, Utility Requirements, Noise, Vibration and Emergency procedures.

## 2. POLICY

The VA New York Harbor Healthcare System (VANYHHS) will ensure the Safety and the Environment of Care will not be adversely affected due to renovation or new construction.

## 3. RESPONSIBILITIES:

a. The Chiefs, Engineering Services are responsible to ensure that an Infection Control Risk Assessment Program is developed and that the necessary actions to implement the program are enforced.
b. The Chief of Planning & Design is responsible for the development of Construction design documents that addresses the Six (6) items identified above as result of renovations or new construction.
c. The Chief, Engineering Services & the Chief of Environmental Services shall coordinate & protect all In-House repairs and maintenance work areas that fall under Class I thru IV category as required in Attachment No. 2.
d. Infection Control Manager is responsible to ensure the following actions are taken:
    1. Participate in the Design Process with Architects & Engineers.
    2. Review construction documents with Project Engineer.
    3. Conduct & Complete the Risk Assessment form in Attachment No. 1 and Attachment No. 2.
    4. Provide recommendations to the Design Team (Architects/ Engineering Consultant & Project Engineers) on any Infection Control issues that arise from construction.

## 5. PROCEDURES:

***Planning & Design***

(a). The Infection Control Risk Assessment (ICRA) is initiated in design and planning stages and continues through construction and renovation. Project Engineers assigned to the project shall incorporate the specific construction related requirements of IRCA in the contract documents. The contract documents shall require the constructor to implement these specific requirements during construction.

(b). The ICRA & the Design Team shall address but not be limited to the following:

1. The impact of disrupting essential services to patients and employees.
2. Patient placement or relocation.
3. Placement of effective barriers to protect susceptible patients from airborne contaminants, such as Aspergillus sp.

4. Air handling and ventilation needs in surgical services, airborne infection isolation and protective environment rooms, laboratories, local exhaust systems for hazardous agents and other special areas.
5. Determination of additional numbers of airborne infection isolation or protective environment room requirements.
6. Consideration of the domestic water system to limit Legionella sp. and waterborne opportunistic pathogens.
7. Assessment for internal and/or external construction projects also includes patient protection from demolition, ventilation and water management following planned or unplanned power outages, movement of debris, traffic flow cleanup and certification.

***Construction***

(a) Projects involving renovation of existing buildings shall include phasing to minimize disruption of existing patient services. Phasing is essential to ensure a safe environment in patient care areas.
(b) Phasing will include assurance for clean to dirty airflow, emergency procedures, criteria for interruption of protection, construction of roof surfaces, written notification of interruption, and communication authority.
(c) Phasing plan shall include considerations of Noise and Vibration control that result from construction activities.
(d) Renovation areas shall be isolated from occupied areas during construction using airtight barriers and exhaust airflow shall be sufficient to maintain negative air pressure in the construction zone.
(e) Existing air quality requirements and other utility requirements for occupied areas shall be maintained.

***Commissioning***

(a) Acceptance criteria for mechanical systems shall be specified. Crucial ventilation specifications for air balance and filtration shall be verified before acceptance. Areas requiring special ventilation include surgical services, protective environments, airborne infection isolation rooms, laboratories, and local exhaust system for hazardous agents. These areas shall be recognized as requiring mechanical systems that ensure infection control, and ventilation deficiencies shall not be accepted.
(b) Acceptance criteria for local exhaust system dealing with hazardous agents shall be specified and verified.

**5. REFERENCES**

The Joint Commission Environment of Care Standard EC.02.06.05
AIA Guidelines for Design & Construction of Hospitals (latest edition)
VACO Life Safety Management Guidebook
ASHE PDC (latest edition)

**6. RESCISSION**

Healthcare System Policy No. 138-27, “Construction & Infection Control Risk Assessment”, dated April 2006

**7. EXPIRATION DATE**

April 2012

Martina Parauda,
Acting Director
Distribution: SC

**Attachment # 1**

| **Infection Control Risk Assessment /Construction Impact Assessment Review** | | |
|---|---|---|
| **Location of Construction: Grnd.Floor, Bldg.6** | **Project Title: Gr. Floor - SPS Suite** | |
| **Project Coordinator : Ken Dickerman CFM** | **Project No. 630-600P** | |
| **Project Start Date : April 2014.** | **Estimated Duration: 1 Yr.** | |
| **Impact** (Are the following items below affected?) | **Yes/No** | **Description** |
| ❑ Patient Placement or Relocation | **No** | |
| ❑ Air Quality (containment, HEPA filtration, isolation /negative airflow rooms ) | **Yes** | **All. See plan.** |
| ***Contractor to provide at least 1/1500 sf HEPA filtration units within the space. Negative Pressure shall be maintained at all times throughout the duration of construction. A differential pressure gauge shall be mounted in the construction partition near the contraction entrance door.*** | | |
| ❑ Noise/Vibration | **Yes** | **Slab removal.** |
| ***Additionally, Contractor shall perform all Slab Demolition/Removal work on Weekends or by written permission of the RE. If said work is within 25 feet of a fresh air intake, Contractor shall protect inlet with particulate filter fabric for the duration of the work being performed.*** | | |
| ❑ Security (work hours) | **Yes** | |
| ***Contractor shall abide by the security requirements of the Station.*** | | |
| ❑ Phasing | **No** | |
| ❑ Life/Safety | **Yes** | **See plan.** |
| ***Interim Life Safety measures/plan shall be presented to the Resident Engineer for Approval.*** | | |
| ❑ Fire Alarm | **Yes** | |
| ❑ Fire Sprinkler | **Yes** | |
| ❑ Exits | **Yes** | |
| ❑ Emergency Power | **Yes** | |
| ❑ HVAC(Infection Issues Environment ) | **Yes** | **See below.** |
| ❑ Barriers (smoke, construction, dust ) | **Yes** | |
| ❑ Medical Gases | **Yes** | **Obtain required permit from Resident Engineer.** |

| | |
|---|---|
| ❑ Plumbing, Domestic Water System | **Yes** |
| ❑ Electrical (occurrence of probable outages) | **No** |
| ❑ Containment issues (traffic flow, housekeeping, debris removal ) | **Yes** **See Specification** |
| ❑ Underground Utilities (Water, Electric, drainage etc.) | **Yes; below Gr. Fl. Slab.** |
| ❑ Vehicle Traffic Flow | **No** |
| ❑ Structural integrity (potential risk ) | **No** |

**Additional Requirements:**

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**<u>Exceptions / Additions to this review are noted by attached memoranda</u>**

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*Assessed by: William Nathans, HDR ARchitecture_____ 02/14/2014_____*
*Name (Print): Date*

Attachment # 2

**Infection Control Risk Assessment**
**Matrix of Precautions for Construction and Renovation**

**Step One:**
**Using the following table, identify the Type of Construction Project Activity (Type A-D)**

| | |
|---|---|
| **TYPE A** | Inspection and Non-Invasive Activities<br>Includes, but is not limited to:<br>• removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet<br>• painting (but not sanding)<br>• wallcovering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection |
| **TYPE B** | Small scale, short duration activities which create minimal dust<br>Includes, but is not limited to:<br>• installation of telephone and computer cabling<br>• access to chase spaces<br>• cutting of walls or ceiling where dust migration can be controlled |
| **TYPE C** | **Work that generates a moderate to high level of dust or required demolition or removal of any fixed building components or assemblies**<br>Includes, but is not limited to:<br>• sanding of walls for painting or wall covering<br>• removal of floorcoverings, ceiling tiles and casework<br>• new wall construction<br>• minor duct work or electrical work above ceilings<br>• major cabling activities<br>• any activity which cannot be completed within a single workshift. |
| **TYPE D** | Major demolition and construction projects<br>Includes, but is not limited to:<br>• activities which require consecutive work shifts<br>• requires heavy demolition or removal of a complete cabling system<br>• new construction |

**STEP 1:** ***TYPE D***

**Step Two:**
**Using the following table, identify the Patient Risk Groups that will be affected.**
**If more than one risk group will be affected, select the higher risk group:**

| Low Risk | Medium Risk | High Risk | Highest Risk |
|---|---|---|---|
| • Office areas | • Cardiology<br>• Echocardiography<br>• Endoscopy<br>• Nuclear Medicine<br>• Physical Therapy<br>• Radiology / MRI<br>• Respiratory Therapy | • CCU<br>• Emergency Room<br>• Laboratories (specimen)<br>• Outpatient Surgery<br>• Pharmacy<br>• Post Anesthesia Care Unit<br>• Surgical Units | • Any area caring for immunocompromised patients<br>• Cardiac Cath Lab<br>• Central Sterile Supply<br>• Intensive Care Units<br>• Medical Unit<br>• Negative pressure isolation rooms<br>• Oncology<br>• Operating Rooms |

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## STEP 2: *LOW RISK*

**Step Three: Match the…**

**Patient Risk Group (*Low, Medium, High, Highest*)** with the planned . . .
**Construction Project Type (*A, B, C, D*)** on the following matrix, to find the . . .
**Class of Precautions (I, II, III or IV)** or level of infection control activities required

**Class I – IV or Color-Coded Precautions are delineated on the following page.**

## *IC Matrix – Class of Precautions: Construction Project by Patient Risk*

| | ***Construction Project Type*** | | | |
|---|---|---|---|---|
| **Patient Risk Group** | **TYPE A** | **TYPE B** | **TYPE C** | **TYPE D** |
| **LOW Risk Group** | **I** | **II** | **II** | **III /IV** |
| **MEDIUM Risk Group** | **I** | **II** | **III** | **IV** |
| **HIGH Risk Group** | **I** | **II** | **III / IV** | **IV** |
| **HIGHEST Risk Group** | **II** | **III / IV** | **III / IV** | **IV** |

Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate That Class III or Class IV control procedures are necessary.

## STEP 3: *TYPE III/IV*

Description of Required Infection Control Precautions by Class

| | During Construction Project | Upon Completion of Project |
|---|---|---|
| CLASS I | 1. Execute work by methods to minimize raising dust from construction operations.<br>2. Immediately replace a ceiling tile displaced for visual inspection. | |
| CLASS II | 1. Provide active means to prevent airborne dust from dispersing into atmosphere.<br>2. Water mist work surfaces to control dust while cutting.<br>3. Seal unused doors with duct tape.<br>4. Block off and seal air vents.<br>5. Place dust mat at entrance and exit of work area.<br>6. Remove or isolate HVAC system in areas where work is being performed. | 1. Wipe work surfaces with disinfectant.<br>2. Contain construction waste before transport in tightly covered containers.<br>3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.<br>4. Remove isolation of HVAC system in areas where work is being performed. |

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| | | |
|---|---|---|
| CLASS III | 1. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system.<br>2. Complete all critical barriers, i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.<br>3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.<br>4. Contain construction waste before transport in tightly covered containers.<br>5. Cover transport receptacles or carts. Tape covering unless solid lid. | 1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.<br>2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.<br>3. Vacuum work area with HEPA filtered vacuums.<br>4. Wet mop area with disinfectant.<br>5. Remove isolation of HVAC system in areas where work is being performed. |
| CLASS IV | 1. Isolate HVAC system in area where work is being done to prevent contamination of duct system.<br>2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.<br>3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.<br>4. Seal holes, pipes, conduits, and punctures appropriately.<br>5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.<br>6. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.<br>7. do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department. | 1. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.<br>2. Contain construction waste before transport in tightly covered containers.<br>3. Cover transport receptacles or carts. Tape covering unless solid lid.<br>4. Vacuum work area with HEPA filtered vacuums.<br>5. Wet mop area with disinfectant.<br>6. Remove isolation of HVAC system in areas where work is being performed. |

**Step 4. Identify the areas surrounding the project area, assessing potential impact**

| Unit Below | Unit Above | Lateral | Lateral | Behind | Front |
|---|---|---|---|---|---|
| **NA** | **LOBBY** | **CORRIDOR** | **EXTERIOR** | **VACANT** | **CORRIDOR** |
| Risk Group<br>**NONE** | Risk Group<br>**LOW** | Risk Group<br>**LOW** | Risk Group<br>**NONE** | Risk Group<br>**NONE** | Risk Group<br>**LOW** |

**Step 5. Identify specific site of activity, e.g. patient rooms, medication room, etc.**

Existing 16,000 sf Fit-out of existing vacant space for SPS.

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**Step 6. Identify issues related to: ventilation, plumbing, electrical in terms of the occurrence of probable outages.**

Tie-ins will be necessary and limited to OT hours. As this building is primarily OP, it is not expected to be an issue. Shut downs are required to be coordinated and scheduled appropriately. Power to this Suite is all new and will be provided as such; independently.

**Step 7. Identify containment measures, using prior assessment. What types of barriers (e.g. solid wall barriers)? Will HEPA filtration be required?**

Solid GWB Partitions will be constructed to the underside of ceilings. Return air ducts will be capped. HEPA Filtration Units and constant negative pressure will be provided and monitored.

(Note: Renovation / construction area shall be isolated from the occupied areas during construction and shall be negative with respect to surrounding areas)

**Step 8. Consider potential risk of water damage. Is there a risk due to compromising structural integrity (e.g. wall, ceiling, roof)? No.**

**Step 9. Work hours: Can or will the work be done during non-patient care hours? Some work will be done during non-patient hours. It is not expected that all the work will be done in such a manner as the costs would prove prohibitive.**

**Step 10. Do plans allow for adequate number of isolation / negative airflow rooms? Negative pressure ante rooms have not been provided.**

**Step 11. Do the plans allow for the required number & type of handwashing sinks? Yes, for final occupancy.**

**Step 12. Does the Infection Control staff agree with the minimum number of sinks for this project? (Verify against AIA Guidelines for types and area) IC has been involved in the design and planning of the SPS Department.**

**Step 13. Does the Infection Control staff agree with the plans of relatives to clean and soiled utility rooms? IC has been involved in the design and planning of the SPS Department.**

**Step 14. Plan to discuss the following containment issues with the project team, e.g. traffic flow, housekeeping, debris removal (how and why)**

Debris shall be removed before and after hours, and shall be covered whenever outside the Construction Area.

Appendix: Identify and communicate the responsibility for project monitoring that includes infection control concerns and risks. The ICRA may be modified throughout the project. Revisions must be communicated to the Project Manager.

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# Infection Control Construction Permit

| | |
|---|---|
| | Permit No: |
| Location of Construction: **OPB, Bldg 6, Gr. Floor** | Project Start Date: |
| Project Coordinator: | Estimated Duration: |
| Contractor Performing Work: | Permit Expiration Date: |
| Supervisor: | Telephone: |

| YES | NO | CONSTRUCTION ACTIVITY | YES | NO | INFECTION CONTROL RISK GROUP |
|---|---|---|---|---|---|
| | | TYPE A: Inspection, non-invasive activity | **X** | | GROUP 1: Low Risk |
| | | TYPE B: Small scale, short duration, moderate to high levels | | | GROUP 2: Medium Risk |
| | | TYPE C: Activity generates moderate to high levels of dust, requires greater 1 work shift for completion | | | GROUP 3: Medium / High Risk |
| **X** | | TYPE D: Major duration and construction activities requiring consecutive work shifts | | | GROUP 4: Highest Risk |

| | | |
|---|---|---|
| CLASS I | 1. Execute work by methods to minimize raising dust from construction operations.<br>2. Immediately replace any ceiling tile displaced for visual inspection | 3. Minor demolition for remodeling |
| CLASS II | 1. Provides active means to prevent air-borne dust from dispersing into atmosphere.<br>2. Water mist work surfaces to control dust while cutting.<br>3. Seal unused doors with duct tape.<br>4. Block off and seal air vents.<br>5. Wipe surfaces with disinfectant. | 6. Contain construction waste before transport in tightly covered containers.<br>7. Wet mop and/or vacuum with HEPA filtered vacuums before leaving work area.<br>8. Place dust mat at entrance and exit of work area.<br>9. Remove or isolate HVAC system in areas where work is being performed. |
| CLASS III<br>_____<br>**Date**<br>_____<br>**Initial** | 1. Obtain infection control permit before construction begins<br>2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system<br>3. Complete all critical barriers or implement control cube method before construction begins.<br>4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units<br>5. Do not remove barriers from work area until complete project is thoroughly cleaned by Environmental Services Department | 6. Vacuum work with HEPA filtered vacuums.<br>7. Wet mop with disinfectant<br>8. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.<br>9. Contain construction waste before transport in tightly covered containers.<br>10. Cover transport receptacles or carts. Tape covering.<br>11. Remove or isolate HVAC system in areas where work is being performed. |
| CLASS IV<br>_____<br>**Date**<br>_____<br>**Initial** | 1. Obtain infection control permit before construction begins<br>2. Isolate HVAC system in area where work is being done to prevent contamination of duct system<br>3. Complete all critical barriers or implement control cube method before construction begins.<br>4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units<br>5. Seal holes, pipes, conduits, and punctures appropriately.<br>6. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work unit. | 7. All personnel entering work site are required to wear shoe covers.<br>8. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Service Department<br>9. Vacuum work area with HEPA filtered vacuums.<br>10. Wet mop with disinfectant.<br>11. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.<br>12. Contain construction waste before transport in tightly covered containers.<br>13. Cover transport receptacles or carts. Tape covering.<br>14. Remove or isolate HVAC system in areas where it is being done. |

Additional Requirements:

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| | |
|---|---|
| Date Initials | Exceptions / Additions to this permit are noted by attached memoranda |
| Permit Request By:<br><br>Date: | Permit Authorized By:<br><br>Date: |

Description of Required Infection Control Precautions

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# Coordination Drawing Checklist

## General —

- ☐ Refer to all contract documents for the details of the required work.
- ☐ Coordinate work with all trades & equipment installers to ensure proper use & access to all items/spaces.
- ☐ Ensure that all trades are aware of their full scope of work. Ensure that all work is performed by personnel properly skilled in the task being performed and aware of their project responsibilities.
- ☐ Ensure that drawings (coordination, erection, layout, shop, setting) required for work of various trades are based on **field measurements**. Verify all dimensions, clearances, information and assumptions on existing conditions.
- ☐ Detail new/existing items within the construction boundary. Drawings shall show in scale material layouts in plan and elevation views with size, location, dimensions from key building elements.
- ☐ Drawings shall be signed by the Contractor's Competent Person & applicable subcontractor responsible person approving the coordination plan.

## Architectural —

- ☐ Coordinate size and location of mechanical shafts with beam locations and room layouts.
- ☐ Coordinate requirements for special hardware locking mechanisms.
- ☐ Coordinate wall thickness with plumbing carriers and hub sizes.
- ☐ Coordinate structural requirements with equipment installation.

## Asbestos —

Verify location and extent of all asbestos with an OSHA competent person.
Coordinate location and removal plan with other trades.
Ensure the following areas are investigated and labeled before the start of work …

- ☐ Lay-in ceilings and plaster ceilings.
- ☐ Transite panel walls, behind finished walls, inside chases and electric panels.
- ☐ Transite panels behind metal housing of heat radiators.
- ☐ Utilities, water, sewer and abandoned lines.
- ☐ Mastic on HVAC systems and exterior walls.
- ☐ Floor tiles and mastic including tiles covered by walls.
- ☐ Carpets adhered to VAT floor tiles.
- ☐ Identify perimeter security, abatement removal locations, negative air system design, PDF/EDF.

## Site —

- ☐ Identify structures for demolition, especially where utilities are located.
- ☐ Verify location of all sanitary, storm water, steam, and electrical structures, other visual utility elements, landscaping elements, pavement, and drainage areas that will be affected by construction.
- ☐ Show all existing utilities whether they are reused or not within or directly adjacent to the construction area. NB - Utilities can be above or below ground.

# Coordination Drawing Checklist

## HVAC —

- ☐ Determine location of existing ducts, pipes, etc. that connect to or that could interfere with new construction.
- ☐ Coordinate shaft sizes and locations with architectural. Line up shafts from floor to floor where feasible.
- ☐ Provide housekeeping pads for all floor mounted equipment.
- ☐ Show vent connections for the dryers, condensate receivers and relief valves.
- ☐ Ensure provisions are made to absorb piping expansion in hot water and steam piping systems.
- ☐ Show all existing equipment, piping, ductwork, etc. near new work to ensure adequacy of available space.
- ☐ Ensure provisions are made for sound attenuation in the HVAC systems to maintain noise criteria.
- ☐ Determine ceiling space requirements for installation of ductwork and piping.
- ☐ Determine location and extent of asbestos on materials.
- ☐ Coordinate locations of asbestos abatement from active systems for reinsulation.
- ☐ Coordinate all motor sizes with electrical.
- ☐ Ensure that all piping risers and runouts are shown.
- ☐ Provide acceptable quantity of isolation valves with locations acceptable to VAMC PE.

## Plumbing —

- ☐ Verify the performance, condition, and capacities of existing plumbing, and fire sprinkler systems that will be connected to construction.
- ☐ Determine locations and extent of asbestos insulation on piping.
- ☐ Coordinate locations of asbestos abatement from active systems and reinsulation.
- ☐ Overlay drawings to reduce utility and plumbing fixture interference with beams and other utilities.
- ☐ Avoid placing water and waste piping above rooms housing electrical, electronic, or telephone equipment, and if another route is not possible, provide encasement of pipe with a larger pipe with no joints over these rooms.
- ☐ Provide acceptable quantity of isolation valves with locations acceptable to VAMC PE.
- ☐ Coordinate wall thickness with for plumbing fixture carriers and with plumbing hub sizes as risers pass through floors.
- ☐ Ensure that downstream drainage system is adequate for discharge.
- ☐ Verify if existing fire sprinkler system needs to be modified.
- ☐ Identify abandoned piping to be removed.

## Electrical —

- ☐ Ensure that power circuits are provided for water coolers, and automatic valves.
- ☐ Ensure that power circuits are provided for ATC panels.
- ☐ Ensure that power circuits are provided for Mechanical equipment and Sprinkler controllers.
- ☐ Check capacity of existing panels in the field before tying in new equipment.
- ☐ Ensure when using existing fire alarm circuits they conform to current fire alarm code.
- ☐ Coordinate motor HP with mechanical and fixed equipment with architectural.
- ☐ Coordinate sizes of circuit breakers with sizes of feeders.

# Coordination Drawing Checklist

- ☐ Verify circuit designations for correctness.
- ☐ Verify emergency power for critical areas.
- ☐ Verify and coordinate panel board schedules and electrical floor plans.
- ☐ Coordinate demolition work with mechanical and other disciplines.
- ☐ Identify abandoned conduit to be removed.

# Daily Log — Construction

**Project Title:** VA Manhattan Campus, Phase 1B Ground Flr SPS Renovations

**T.O. Project #:** VA101F-13-J-0204

**Contractor:** ___

**Contract #:** ___

**Notice To Proceed:** ___

**Expired:** _____ *Calendar Days*

**Duration:** ___ *Calendar Days*

| Calendar … | Time … | Out/In Tmp … | Weather … | Comments … |
|---|---|---|---|---|
| Date: ___ | 9 AM J | – | | |
| Day: ___ | 3 PM J | – | | |

| Branch of Work | Skilled Workers or Helpers | Unskilled Workers | Location and Work Description |
|---|---|---|---|
| | | | |
| **Total Man Power J** | | | **Project Completion J** _____ % |

| Status | Equipment | Workers | Progress | Materials Delivered |
|---|---|---|---|---|
| Satisfactory | | ☺ | | 4 |
| Unsatisfactory | | ☹ | | 8 |

**Remarks:** ___

☑

**Daily submission of Log required for Validation**

☒

Rec'd J _____

# Electrical Panel Schedule

Status: ☑ ✋ ☒ Date:

❍ Normal ↔ Emergency ❍

Panel: Location:

Mfg: Type: Mounting Style:

Voltage: Phase: Gnd Bus:

Main Lugs (amps): Poles: Main Brkr (amps):

Feeder Panel #: Feeder Brkr #:

Wire Qnt & Size: Neutral Size: Ground Size: Conduit Size:

| Function | Pole | Amps | Circuit Number | | Amps | Pole | Function |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | | | |
| | | | 3 | 4 | | | |
| | | | 5 | 6 | | | |
| | | | 7 | 8 | | | |
| | | | 9 | 10 | | | |
| | | | 11 | 12 | | | |
| | | | 13 | 14 | | | |
| | | | 15 | 16 | | | |
| | | | 17 | 18 | | | |
| | | | 19 | 20 | | | |
| | | | 21 | 22 | | | |
| | | | 23 | 24 | | | |
| | | | 25 | 26 | | | |
| | | | 27 | 28 | | | |
| | | | 29 | 30 | | | |
| | | | 31 | 32 | | | |
| | | | 33 | 34 | | | |
| | | | 35 | 36 | | | |
| | | | 37 | 38 | | | |
| | | | 39 | 40 | | | |
| | | | 41 | 42 | | | |

# Electrical Panel Schedule

Status: ☑ ✋ ☒ Date:

❍ Normal ↔ Emergency ❍

Panel: Location:

Mfg: Type: Mounting Style:

Voltage: Phase: Gnd Bus:

Main Lugs (amps): Poles: Main Brkr (amps):

Feeder Panel #: Feeder Brkr #:

Wire Qnt & Size: Neutral Size: Ground Size: Conduit Size:

| Function | Pole | Amps | Circuit Number | | Amps | Pole | Function |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | | | |
| | | | 3 | 4 | | | |
| | | | 5 | 6 | | | |
| | | | 7 | 8 | | | |
| | | | 9 | 10 | | | |
| | | | 11 | 12 | | | |
| | | | 13 | 14 | | | |
| | | | 15 | 16 | | | |
| | | | 17 | 18 | | | |
| | | | 19 | 20 | | | |
| | | | 21 | 22 | | | |
| | | | 23 | 24 | | | |
| | | | 25 | 26 | | | |
| | | | 27 | 28 | | | |
| | | | 29 | 30 | | | |
| | | | 31 | 32 | | | |
| | | | 33 | 34 | | | |
| | | | 35 | 36 | | | |
| | | | 37 | 38 | | | |
| | | | 39 | 40 | | | |
| | | | 41 | 42 | | | |

VA MEDICAL CENTER

# HOT WORK PERMIT

For Cutting, Welding, Soldering, Brazing With Portable Gas Or Arc Equipment

| | |
|---|---|
| **Date:** | |
| **Building Number:** | **Floor:** |
| **VAMC:** | |
| **Department:** | |
| **Project Name:** | **Project #:** |
| **General Contractor (GC):** | |
| **GC Site Supervisor:** | |
| **Sub-Contractor:** | |
| **Work to be done:** | |
| **Is Fire Watch required to be performed by Contractor?** | **Permit Expires:** |
| **The location where this work is to be done has been examined, necessary precautions taken, and permission granted for this work.** | |
| **Signature of Approving Official** | |
| **Time Started:** | **Time Finished:** |

## ATTENTION

Before approving any hot work permit, the approving official or designee shall inspect the work area and confirm that the Contractor has taken precautions to prevent fire in accordance with NFPA 51B.

| | |
|---|---|
| **PRECAUTIONS** | Sprinklers in service.<br>Cutting and welding equipment in good repair. |
| **WITHIN 35 FT OF WORK** | Floor swept clean of combustibles.<br>Combustible floors wet down, covered with damp sand, metal or other shields.<br>No combustible materials or flammable liquids.<br>Combustibles and flammable liquids protected with covers, guards or metal shields.<br>All wall and floor openings covered.<br>Covers suspended beneath work to collect sparks. |
| **WORK ON WALLS OR CEILINGS**<br>**WORK ON ENCLOSED EQUIPMENT (tanks, containers, ducts, etc.)** | Construction noncumbustible and without covering.<br>Combustibles moved away from the opposite side of wall.<br>Equipment cleaned of all combustibles.<br>Containers purges of all flammable vapors. |
| **FIRE WATCH (IF NECESSARY)** | To be provided during and 30 minutes after operation.<br>Supplied with fire extinguisher and/or small hose.<br>Trained in use of equipment and in sounding the fire alarm. |

## FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sites of walls) were inspected 30 minutes after the work was completed and were found fire safe.

Signature of Approving Official

**RFI:** .....

# Request for Information

**Issue Date:** .....

**Rev:** .....

## Construction

**Respond By:** .....

**Project Title:** .....

**Project #:** .....

**Document Ref:** .....

**To:** .....

**Category**

☹ Contract Requirement Interpretation
❍ Contract Requirement Conflict
❍ Contract Requirement Missing
☹ Coordination Issue
❍ Submittal Issue

**Impact**

☹ Contract Cost (Add/Delete) } $ .....
❍ Construction Schedule } .....
❍ Contract Duration (+/-) } ..... Days

**Interim Action Status Pending Reply**

❍ Holding } .....
☺ Proceeding } .....

---

**Query** ⟶ **Subject:** .....

**Name:** .....

**Company:** .....

---

**Response** ⟶ **Reference:** .....

Caveat — A "Response" does not constitute an agreement with the "Impact"

**Respondent:** .....

**VA Project Engineer:** .....

**Date:** .....

# Project Submittal Status Log



**Project Title:** *VA Manhattan Campus, Phase 1B Ground Flr SPS Renovations*

**T.O. #:** *VA101F-13-J-0204*

**Contractor:**

**Notice To Proceed (NTP):**

**Duration:**

**Review Action**

| | | | |
|---|---|---|---|
| AP | ➡ | Approved ↳ | 4 Subject to compliance and execution with the contract requirements. |
| AC | ➡ | Accepted ↳ | 3 Generally conforms to the contract requirements make corrections noted. |
| R | ➡ | Rejected ⮌ | 8 ☹ Not in conformance with exceptions noted. |
| R&R | ➡ | Revise & Resubmit ⮌ | 7 ☹ Incomplete to perform a coherent evaluation with exceptions noted. |

| Sec | Description | # | Expected | Issued | Rev'd | Action | Res'd | Ret'd | Action | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 01 00 00 | General Requirements | 1 | | | | | | | | Phasing Schedule Plan |
| 01 32 16.13 | Network Analysis Schedules | 2 | | | | | | | | |
| 01 45 29 | QC – Inspection – Testing Services | 3 | | | | | | | | Coordination Dwg |
| 01 57 19 | Environmental Controls | 4 | | | | | | | | |
| 01 73 29 | Cutting and Patching | 5 | | | | | | | | |
| 01 74 19 | Construction Waste Management | 6 | | | | | | | | |
| 01 99 99 | Project Closeout | 7 | | | | | | | | |
| | | | | | | | | | | |
| 02 41 00 | Demolition | 8 | | | | | | | | |
| | | | | | | | | | | |
| 03 30 00 | Cast-In-Place Concrete | 9 | | | | | | | | |
| 03 54 16 | Cementitious Self-Leveling Underlayment | 10 | | | | | | | | |
| | | | | | | | | | | |
| Div 04 | Mortar, Grout & Masonry | 11 | | | | | | | | |
| | | | | | | | | | | |
| 05 50 00 | Metal Fabrications | 12 | | | | | | | | |
| | | | | | | | | | | |
| 06 10 00 | Rough Carpentry | 13 | | | | | | | | |
| 06 20 00 | Finish Carpentry | 14 | | | | | | | | |
| | | | | | | | | | | |
| 07 01 05 | Roof Maintenance & Repair | 15 | | | | | | | | |
| 07 16 16 | Cementitious Crystalline Waterproofing | 16 | | | | | | | | |
| 07 60 00 | Flashing & Sheet Metal | 17 | | | | | | | | |

# Project Submittal Status Log



| Sec | Description | # | Expected | Issued | Rev'd | Action | Res'd | Ret'd | Action | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 07 81 00 | Applied Fireproofing | 18 | | | | | | | | |
| 07 84 00 | Firestopping | 19 | | | | | | | | |
| 07 92 00 | Joint Sealants | 20 | | | | | | | | |
| | | | | | | | | | | |
| 08 11 13 | Hollow Metal Doors & Frames | 21 | | | | | | | | |
| 08 31 13 | Access Doors & Frames | 22 | | | | | | | | |
| 08 33 13 | Coiling Counter Doors | 23 | | | | | | | | |
| 08 41 13 | Aluminum-Framed Entrances and Storefronts | 24 | | | | | | | | |
| 08 56 19 | Pass Windows | 25 | | | | | | | | |
| 08 71 00 | Door Hardware | 26 | | | | | | | | |
| 08 71 13 | Automatic Door Operators | 27 | | | | | | | | |
| 08 71 13.11 | Low Energy Power Assist Door Operators | 28 | | | | | | | | |
| 08 80 00 | Glazing | 29 | | | | | | | | |
| | | | | | | | | | | |
| 09 22 16 | Non-Structural Metal Framing | 30 | | | | | | | | |
| 09 29 00 | Gypsum Board | 31 | | | | | | | | |
| 09 30 13 | Ceramic/Porcelain Tiling | 32 | | | | | | | | |
| 09 51 00 | Acoustical Ceilings | 33 | | | | | | | | |
| 09 67 23.60 | Resinous (Urethane & Epoxy Mortar) Flooring | 34 | | | | | | | | |
| 09 91 00 | Painting | 35 | | | | | | | | |
| 09 97 33.10 | Resinous Coating Systems for Walls and Ceilings | 36 | | | | | | | | |
| | | | | | | | | | | |
| 10 11 13 | Chalkboards and Markerboards | 37 | | | | | | | | |
| 10 14 00 | Signage | 38 | | | | | | | | Room Signage |
| 10 21 13 | Toilet Compartments | 39 | | | | | | | | |
| 10 26 00 | Wall & Door Protection | 40 | | | | | | | | |
| 10 28 00 | Toilet & Bath Accessories | 41 | | | | | | | | |
| 10 44 13 | Fire Extinguisher Cabinets | 42 | | | | | | | | |
| 10 51 31 | Metal Lockers | 43 | | | | | | | | |
| | | | | | | | | | | |

# Project Submittal Status Log



| Sec | Description | # | Expected | Issued | Rev'd | Action | Res'd | Ret'd | Action | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 71 01 | Medical Washing and Sterilizing Equipment | 44 | | | | | | | | |
| | | | | | | | | | | |
| 12 24 21 | Lightproof Shades | 45 | | | | | | | | |
| 12 31 00 | Manufactured Metal Casework and Wall Shelving | 46 | | | | | | | | |
| 12 36 00 | Countertops | 47 | | | | | | | | |
| | | | | | | | | | | |
| 13 05 41 | Seismic Restraints | 48 | | | | | | | | |
| | | | | | | | | | | |
| 14 21 11 | Traction Cartlifts | 49 | | | | | | | | |
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| 21 05 11 | General Fire Suppression Requirements | 50 | | | | | | | | |
| 21 13 13 | Wet Pipe Sprinkler Systems | 51 | | | | | | | | |
| | | | | | | | | | | |
| 22 05 11 | General Plumbing Requirements | 52 | | | | | | | | |
| 22 05 12 | Motor Requirements for Plumbing | 53 | | | | | | | | |
| 22 05 23 | Plumbing Piping General-Duty Valves | 54 | | | | | | | | |
| 22 07 00 | Plumbing Insulation | 55 | | | | | | | | |
| 22 11 00 | Facility Water Distribution | 56 | | | | | | | | |
| 22 13 00 | Facility Sanitary & Vent Piping | 57 | | | | | | | | |
| 22 15 00 | Laboratory Compressed-Air Systems | 58 | | | | | | | | |
| 22 40 00 | Plumbing Fixtures | 59 | | | | | | | | |
| 22 67 19.16 | Reverse-Osmosis Water Equipment | 60 | | | | | | | | |
| | | | | | | | | | | |
| 23 05 11 | General Mechanical Requirements | 61 | | | | | | | | |
| 23 05 12 | Motor Requirements for HVAC | 62 | | | | | | | | |
| 23 05 41 | Noise & Vibration Control | 63 | | | | | | | | |
| 23 05 93 | TAB for HVAC | 64 | | | | | | | | |
| 23 07 11 | HVAC Insulation | 65 | | | | | | | | |
| 23 09 23 | DDC System for HVAC | 66 | | | | | | | | |
| 23 21 13 | Hydronic Piping | 67 | | | | | | | | |

**Project Submittal Status Log**



| Sec | Description | # | Expected | Issued | Rev'd | Action | Res'd | Ret'd | Action | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 21 23 | Hydronic Pumps | 68 | | | | | | | | |
| 23 22 13 | Steam & Condensate Heating Piping | 69 | | | | | | | | |
| 23 31 00 | HVAC Ductwork & Casings | 70 | | | | | | | | |
| 23 34 00 | HVAC Fans | 71 | | | | | | | | |
| 23 36 00 | Air Terminal Units | 72 | | | | | | | | |
| 23 37 00 | Air Outlets & Inlets | 73 | | | | | | | | Refer to Sec 23 31 00 |
| 23 40 00 | HVAC Air Cleaning Devices | 74 | | | | | | | | |
| 23 43 50 | UVC Fixtures for HVAC Equipment | 75 | | | | | | | | |
| 23 73 00 | Indoor Air Handling Unit | 76 | | | | | | | | |
| 23 82 00 | Fan Coil Units | 77 | | | | | | | | |
| 23 82 16 | Air Coils | 78 | | | | | | | | |
| | | | | | | | | | | |
| 26 05 11 | General Electrical Requirements | 79 | | | | | | | | |
| 26 05 19 | Low Voltage Conductors & Cables | 80 | | | | | | | | |
| 26 05 26 | Grounding & Bonding | 81 | | | | | | | | |
| 26 05 33 | Raceway & Boxes | 82 | | | | | | | | |
| 26 09 23 | Lighting Controls | 83 | | | | | | | | |
| 26 22 00 | Low Voltage Transformers | 84 | | | | | | | | |
| 26 24 16 | Panelboards | 85 | | | | | | | | |
| 26 27 26 | Wiring Devices | 86 | | | | | | | | |
| 26 29 11 | Motor Controllers | 87 | | | | | | | | |
| 26 29 21 | Enclosed Switches & Circuit Breakers | 88 | | | | | | | | |
| 26 51 00 | Interior Lighting | 89 | | | | | | | | |
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| 27 05 11 | General Communications Requirements | 90 | | | | | | | | |
| 27 05 26 | Grounding & Bonding for Communications Systems | 91 | | | | | | | | |
| 27 05 33 | Raceway & Boxes for Communications Systems | 92 | | | | | | | | |
| 27 51 16 | Public Address & Mass Notification Systems | 93 | | | | | | | | |
| 27 51 23 | Intercommunications & Program Systems | 94 | | | | | | | | |

| Sec | Description | # | Expected | Issued | Rev'd | Action | Res'd | Ret'd | Action | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 28 05 00 | General Electronic Safety & Security Requirements | 95 | | | | | | | | |
| 28 05 13 | Conductors & Cables for Electronic Safety & Security | 96 | | | | | | | | |
| 28 05 26 | Grounding & Bonding for Electronic Safety & Security | 97 | | | | | | | | |
| 28 05 28.33 | Conduits & Backboxes for Electronic Safety & Security | 98 | | | | | | | | |
| 28 31 00 | Fire Detection & Alarm | 99 | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

**Remarks – Conditions**

- Delays attributed to untimely/disapproved submittal information shall not serve as a basis for claims.
- Submittals shall conform to the requirements of Section 01 33 23 meeting the requirements of the submitted Section.
- Substitution of specified elements shall be identified ("D" – Deviation) and subject to the requirements of Section 01 33 23.
- Review does not relieve the Contractor from responsibility for any errors, omissions, deviations not explicitly identified by the Contractor.
- Approval is only for conformance with the design concept of the Project and compliance given in the Contract Documents. Approval of drawings or items does not relieve the Contractor of the responsibility for complying with all the requirements of the Contract Documents.

**Project Title:** VA Manhattan Campus, Phase 1B Ground Flr SPS Renovs **T.O. #:** **VA101F-13-J-0204**

**General Contractor:** **Subcontractor/Supplier:**

**Location:** **Issue Date:**

| **Mechanical System Valve Chart** | | |
|---|---|---|
| **Valve Tag** | **Room - Location** | **Service - Function** |
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## Legend

Ch W Sup or Ret } Chilled Water Supply or Return

HW Sup or Ret } Hot Water Supply or Return

Cond } Condensate

ST } Steam

## Special Remarks

**Project Title:** VA Manhattan Campus, Phase 1B Ground Flr SPS Renovs **T.O. #:** **VA101F-13-J-0204**

**General Contractor:** **Subcontractor/Supplier:**

**Location:** **Issue Date:**

| **Plumbing System Valve Chart** | | |
|---|---|---|
| **Valve Tag** | **Room - Location** | **Service - Function** |
| CW 1 | | |
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## Legend

CW } Cold Water HW } Hot Water

**Special Remarks**

# SECTION 01 32 16.13
# NETWORK ANALYSIS SCHEDULES

## PART 1- GENERAL

### 1.1 DESCRIPTION

A. The Contractor shall develop a Network Analysis System (NAS) plan and schedule demonstrating fulfillment of the contract requirements, shall keep the network up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy both time and cost applications. All schedule data and reports required under this specification section shall be based upon regular total float, not relative total float schedules.

### 1.2 CONTRACTOR'S CONSULTANT

A. To prepare the network diagram, and compact disk(s), which reflects the Contractor's project plan, the Contractor shall engage an independent CPM/PDM consultant who is skilled in the time and cost application of scheduling using (PDM) network techniques for construction projects, the cost of which is included in the Contractor's bid. This consultant shall not have any financial or business ties to the Contractor, and shall not be an affiliate or subsidiary company of the Contractor, and shall not be employed by an affiliate or subsidiary company of the Contractor.

B. Prior to engaging a consultant, and within ten (10) calendar days after award of the contract, the Contractor shall submit to the Contracting Officer:

1. The name and address of the proposed CPM/PDM consultant.
2. Sufficient information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
3. A list of prior construction projects, along with selected PDM network diagram samples on current projects which the proposed consultant has performed complete project scheduling services. These network diagram samples must show complete project planning for a project of similar size and scope as covered under this contract.

C. The Contracting Officer has the right to approve or disapprove employment of the proposed consultant, and will notify the Contractor of the VA decision within seven (7) calendar days from receipt of information. In case of disapproval, the Contractor shall resubmit another consultant within ten (10) calendar days for renewed consideration. The Contractor must have their CPM/PDM Consultant approved prior to submitting any diagram.

**1.3 COMPUTER PRODUCED SCHEDULES**

A. The contractor shall provide to the VA, Senior Resident Engineer and CPM Schedule Analyst, monthly computer processing of all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three (3) copies of up to five (5) different reports (inclusive of all pages) available within the user defined reports of Primavera (P3 or P6) to the contracting officer’s representative; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data in Primavera (P3 or P6) batch format; and the resulting monthly updated schedule in a compressed electronic file in Primavera (P3 or P6), (PDM) format. These must be submitted with and substantively support the contractor’s monthly payment request and the signed lookahead report. The resident engineer shall identify the five (5) different report formats that the contractor shall provide based upon the monthly schedule updates.

B. The contractor is responsible for the correctness and timeliness of the computer-produced reports. The Contractor is also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.

C. The VA shall report errors in computer-produced reports to the Contractor’s representative within ten (10) calendar days from receipt of reports. The Contractor will reprocess the computer-produced reports and associated compact disk(s), when requested by the Contracting Officer’s representative, to correct errors which affect the payment and schedule for the project.

**1.4 THE COMPLETE PROJECT NETWORK DIAGRAM SUBMITTAL**

A. Within 45 calendar days (60 calendar days on projects over $50,000,000) after receipt of Notice to Proceed, the Contractor shall submit for the

Contracting Officer's review; three (3) blue line copies of the complete network diagram on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in a compressed Primavera (P3 or P6), (PDM) format. The submittal shall also include three (3) copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, duration, predecessor and successor relationships, trade code, area code, description, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start and start-to-start without lead or lag constraints. The lead or lag for the SS relationships may only be allowed in limited basis if justified in writing and must be approved by the Contracting Officer. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer’s written approval before incorporating them into the network diagram. The Contracting Officer’s separate approval of the network diagram shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have a zero duration. The complete working network diagram shall reflect the Contractor's approach to scheduling the complete project. **The final network diagram in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents.** These changes/delays shall be entered at the first update after the final network diagram has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

B. Within 30 calendar days after receipt of the complete project network diagram, the Contracting Officer or his representative, will do one or both of the following:
   1. Notify the Contractor concerning his actions, opinions, and objections.
   2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three (3) blue line copies of the revised network diagram, three (3) copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.

C. The approved baseline network diagram schedule and the corresponding computer-produced schedule(s) shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

D. The Complete Project Network Diagram will contain work activities/events for each phase/portion of the project that includes pre-site work, site work, demolition, construction, and closeout.

**1.5 WORK ACTIVITY/EVENT COST DATA**

A. The Contractor shall cost load all work activities/events except procurement activities. The cost loading shall reflect the appropriate level of effort of the work activities/events. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. In the event of disapproval, the Contractor shall revise and resubmit in accordance with Article, THE COMPLETE PROJECT NETWORK DIAGRAM SUBMITTAL. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

B. The Contractor shall cost load work activities/events for testing, balancing and adjusting various systems in accordance with the provisions in the FAR 52.232 – 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), Article, and VAAR 852.236 - 83(PAYMENTS UNDER FIXED-PRICE CONSTRUCTION).

C. In accordance with Article PERFORMANCE OF WORK BY THE CONTRACTOR in FAR 52.236 – 1 and VAAR 852.236 - 72, the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.

D. The Contractor shall cost load work activities/events for all BID ITEMS. The sum of the cost loading for each bid item work activities/events shall equal the value of the item in the Contractors' bid.

E. Work activities/events for Contractor bond shall have a trade code and area code of BOND.

**1.6 NETWORK DIAGRAM REQUIREMENTS**

A. Show on the network diagram the sequence and interdependence of work activities/events required for complete performance of all items of work. In preparing the network diagram, the Contractor shall:

1. Exercise sufficient care to produce a clear, legible and accurate network diagram, refer to the drawing, CPM-1 (Sample CPM Network). Computer plotted network diagrams shall legibly display and plot all information required by the VA CPM activity/event legend or the computer plotted network diagram will not be acceptable. If the computer plotted network diagram is not found acceptable by the contracting officer’s representative, then the network diagram will need to be hand drafted and meet legibility requirements. Group activities related to specific physical areas of the project, on the network diagram for ease of understanding and simplification. Provide a key plan on each network diagram sheet showing the project area associated with the work activities/events shown on that sheet.
2. Show the following on each work activity/event:
   a. Activity/Event ID number.

b. Concise description of the work represented by the activity/event. (35 characters or less including spaces preferred).

c. Performance responsibility or trade code (five alpha characters or less): GEN, MECH, ELEC, CARP, PLAST, or other acceptable abbreviations.

d. Duration (in work days.)

e. Cost (in accordance with Article, ACTIVITY/EVENT COST DATA of this section and less than $9,999,999 per activity).

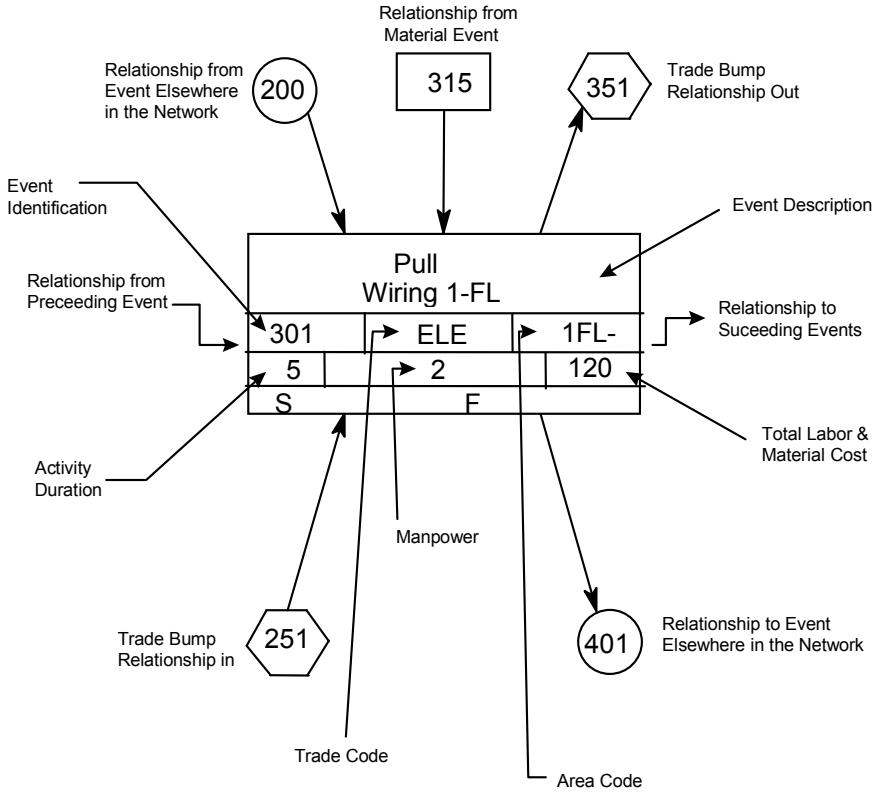
f. Work location or area code (five characters or less), descriptive of the area involved.

g. Manpower required (average number of men per day).

h. The SYMBOL LEGEND format shown below and on the drawing, CPM-1 (Sample CPM Network) is mandatory and shall be followed in preparing final network diagrams.

# SYMBOL LEGEND

**Show Network Diagram page number location(s) for all incoming/outgoing node connector(s).**



3. Show activities/events as:
   a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
   b. Contracting Officer's and Architect/Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
   c. Interruption of VA Medical Center utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
   d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
   e. **Commissioning Activities** – Based upon the project specific Commissioning plan and the specification section 01 91 00, the contractor shall include in the **Day 1 CPM Diagram all the systems commissioning activities (see systems covered in Division 7, 8, 21, 22, 23, 27, 26, 28, and others as specified)** such as start up, Pre-functional check list, Pre –test, individual component and system level Functional test, Operator’s training, O.& M. Manuals etc.(including any deficiency correction and re-testing). **The majority of commissioning activities should be completed as part of the normal construction schedule and finalized prior to the construction contract completion date.** To this end, it is imperative that the Commissioning Agent and the Contractor collaborate to integrate commissioning activities into the Contractor’s overall construction schedule. All commissioning activities shall be cost loaded as required in the earlier paragraphs.
   f. The Commissioning Plan will identify critical commissioning activities and associated construction/start up tasks that must precede these activities to allow for successful execution of the commissioning activities. In order to coordinate these activities with the construction schedule, a **Commissioning Duration Schedule s**hould be provided by the Commissioning Agent to the VA RE and the Contractor to provide a rational basis for integration of commissioning into the Day 1 diagram and the

construction schedule. The Commissioning Duration Schedule should include the following information:

1) Description of Commissioning Activity
2) Prerequisite Construction Tasks Required to Execute the Cx Activity
3) Elapsed Time Duration of Each Activity
4) Documentation Associated with Each Task/Document Responsibility

g. Once the duration schedule is delivered to the Contractor, the Commissioning Agent will collaborate with the Contractor to integrate all commissioning activities into the fixed duration construction schedule in accordance with VA NAS requirements for scheduling the project.

h. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase. Schedule these activities/events so that only one phase is scheduled for completion within the same 30 consecutive calendar day period (except for those phases immediately preceding the final acceptance). Maintain this scheduling condition throughout the length of the contract unless waived by the Contracting Officer’s representative in writing.

i. Bid items other than the Base Bid (ITEM 1) item shall have trade codes corresponding to the appropriate bid item number (e.g., ITM 3, ITM 4 and other items).

4. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area to another area for at least five trades who are performing major work under this contract.

5. Break up the work into activities/events of a duration no longer than 20 work days each, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the Contracting Officer may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals shall not be less than 20 work days. Refer to drawing CPM-1 for VA approval

activities/events which will require minimum duration longer than 20 workdays. The construction time as determined by the CPM schedule from early start to late finish for any sub-phase, phase or the entire project shall not exceed the contract time(s) specified or shown.

6. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
7. Uniquely number each activity/event with numbers ranging from 1 to 99998 only. The network diagram should be generally numbered in such a way to reflect discipline, phase or location of the work.

B. Submit the following supporting data in addition to the network diagram, activity/event ID schedule and electronic file (s). Failure of the Contractor to include this data will delay the review of the submittal until the Contracting Officer is in receipt of the missing data:

1. The proposed number of working days per week.
2. The holidays to be observed during the life of the contract (by day, month, and year).
3. The planned number of shifts per day.
4. The number of hours per shift.
5. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.
6. Provide a typed, doubled spaced, description, at least one page in length, of the plan and your approach to constructing the project.

C. To the extent that the network diagram or any revised network diagram shows anything not jointly agreed upon, it shall not be deemed to have been approved by the Contracting Officer. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the Contracting Officer's approval of the network diagram.

D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA (Senior resident Engineer and CPM Schedule Analyst) an

electronic file(s) containing one file of the data required to produce a Primavera (P3 or P6), (PDM) produced schedule, reflecting all the activities/events of the complete project network diagram being submitted.

**1.7 PAYMENT TO THE CONTRACTOR**

A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 and G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article FAR 52.232 – 5 (PAYMENTS UNDER FIXED-PRICE CONSTRUCTION), and VAAR 852.236 - 83(PAYMENTS UNDER FIXED-PRICE CONSTRUCTION). The Contractor is entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated computer-produced calendar-dated schedule unless, in special situations, the Contracting Officer permits an exception to this requirement. Monthly payment requests shall include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of Primavera (P3 or P6), (PDM) to the contracting officer’s representative; a listing of all project schedule changes, and associated data, made at the update; and an electronic file (s) of the resulting monthly updated schedule in a compressed Primavera (P3 or P6), (PDM) format. These must be submitted with and substantively support the contractor’s monthly application and certificate for payment request documents.

B. When the Contractor fails or refuses to furnish to the Contracting Officer the information and the associated updated Primavera (P3 or P6), (PDM) schedule in electronic format, which, in the sole judgment of the Contracting Officer, is necessary for processing the monthly progress payment, the Contractor shall not be deemed to have provided an estimate and supporting schedule data upon which progress payment may be made.

**1.8 PAYMENT AND PROGRESS REPORTING**

A. Monthly job site progress meetings shall be chaired by independent CPM/PDM consultant and meetings shall be held on dates mutually agreed to by the Contracting Officer (or Contracting Officer's representative) and the Contractor. Contractor and the CPM/PDM consultant will be

required to attend all monthly progress meetings. Presence of Subcontractors during progress meeting is optional unless required by the Contracting Officer (or Contracting Officer's representative). The Contractor shall update the project schedule and all other data required by this section shall be accurately filled in and completed prior to the monthly progress meeting. The Contractor shall provide this information to the Contracting Officer or the VA representative in completed form three work days in advance of the progress meeting. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration, required to complete each activity/event started, or scheduled to start, but not completed.
3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the network diagram and computer-produced schedules. Changes in activity/event sequence and duration which have been made pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
4. Percentage for completed and partially completed activities/events.
5. Logic and duration revisions required by this section of the specifications.
6. Activity/event duration and percent complete shall be updated independently.

B. The Contractor shall submit a narrative report as a part of his monthly review and update, in a form agreed upon by the Contractor and the Contracting Officer. The narrative report shall include a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities/events and completion dates; and an explanation of corrective action taken or proposed. This report is in addition to the daily reports pursuant to the provisions of Article, DAILY REPORT OF WORKERS AND MATERIALS in the GENERAL CONDITIONS.

C. After completion of the joint review and the Contracting Officer's approval of all entries, the contractor will generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer’s representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

D. After completing the monthly schedule update, the contractor's scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the consultant shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**

E. After VA acceptance and approval of the final network diagram, and after each monthly update, the contractor shall submit to the Contracting Officer three blue line copies of a revised complete network diagram showing all completed and partially completed activities/events, contract changes and logic changes made on the intervening updates or at the first update on the final diagram. The Contracting Officer may elect to have the contractor do this on a less frequent basis, but it shall be done on a quarterly basis as a minimum.

F. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor

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

**1.9 RESPONSIBILITY FOR COMPLETION**

A. Whenever it becomes apparent from the current monthly progress review meeting or the monthly computer-produced calendar-dated schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
   1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
   2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
   3. Reschedule the work in conformance with the specification requirements.

B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the Contracting Officer for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the network diagram before the next update, at no additional cost to the Government.

**1.10 CHANGES TO NETWORK DIAGRAM AND SCHEDULE**

A. Within 30 calendar days after VA acceptance and approval of any updated computer-produced schedule, the Contractor will submit a revised network diagram, the associated compact disk(s), and a list of any activity/event changes including predecessors and successors for any of the following reasons:
   1. Delay in completion of any activity/event or group of activities/events, indicate an extension of the project completion by 20 working days or 10 percent of the remaining project duration, whichever is less. Such delays which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve

the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.

2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
3. The schedule does not represent the actual prosecution and progress of the project.
4. When there is, or has been, a substantial revision to the activity/event costs of the network diagram regardless of the cause for these revisions.

B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Medical Center, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, must be furnished in writing to the Contracting Officer for approval.

C. Contracting Officer's approval for the revised network diagram and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.

D. The cost of revisions to the network diagram resulting from contract changes will be included in the proposal for changes in work as specified in Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 – 88 (CHANGES – SUPPLEMENTS), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.

E. The cost of revisions to the network diagram not resulting from contract changes is the responsibility of the Contractor.

**1.11 ADJUSTMENT OF CONTRACT COMPLETION**

A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the Contracting Officer may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule

must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under Article, FAR 52.243 -4 (CHANGES), VAAR 852.236 – 88 (CHANGES – SUPPLEMENTS). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.

D. All delays due to non-work activities/events such as RFI’s, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

**1.12 CONSTRUCTION SCHEDULE RISK ANALYSIS / MITIGATION PLAN**

A. Schedule Risk Analysis – The contractor shall conduct the statistical schedule risk analysis based on the above detailed construction activities in the Day 1 approved diagram, identifying major schedule risk areas and recommended risk mitigation plans as outlined below.

B. The risk analysis shall be conducted by a person or firm skilled in the statistical method of schedule risk analysis based on the (PDM) network techniques for major construction projects, preferably in the major health care related projects. The cost of this service shall be included in the Contractor's proposal.

C. The Contracting Officer has the right to approve or disapprove the person or firm designated to perform the risk analysis.

**1.13 RISK ANALYSIS FORMAT / REQUIREMENTS / SUBMITTALS**

A. Risk Analysis Software / Format - Within 45 calendar days (60 calendar days on projects over $50,000,000) after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; a Risk Analysis software to be utilized, the method of performing the analysis, the format of presenting the data and the reports for VA approval.

B. Conduct Risk Analysis **/ Submittals - Based on the approved software / format, the consultant shall** perform statistical risk analysis on the detailed approved Day 1 diagram. The contractor shall review and utilize any previous Risk analysis performed by the A/E of record based on the “semi-detailed” (yet at an overall level) construction logic and schedule to ensure the continuity of previous schedule risk analysis. The contractor’s project manager and Superintendent shall identify the major schedule risk areas and possible risk mitigation strategy/plan and record it in a narrative format, with **electronic file submission** to the VA. **The risk analysis exercise shall be performed or updated at least on a quarterly basis or as directed by the VA Contracting officer.**

C. The submittal shall include three copies of a computer-produced risk analysis results, predicting the various meaningful probability curves of achieving the contract schedules. It shall also include a detailed narrative list of all major and minor potential and specific schedule and cost risk areas, and a contractor’s recommendations of mitigating the identified risks which must be addressed by the VA Project and Resident engineer teams to maintain the contract schedule.

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

1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

1-2. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, 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 in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

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

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

A. Submit samples required by the separate Sections of the specifications 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 Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.

C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory

Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.

1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
2. Certificates shall also set forth a list of comparable projects upon which the laboratory has performed similar functions during past five (5) years.
3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
5. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.

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

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

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

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

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

HDR Architecture and Engineering
Att: Brian Cheng
500 Seventh Avenue, 11th Floor
New York, NY 10018

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.

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# SECTION 01 41 50
# SEISMIC CONTROL REQUIREMENTS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Seismic control requirements for architectural, mechanical, and electrical building components.

### 1.2 DESIGN REQUIREMENTS

A. Design, select, construct, and install work and equipment to resist seismic forces as required by IBC latest edition and ASCE-7 Chapter 13 as referenced and amended by VA Seismic Design Requirements 8/13 (H-18-8) for:
   1. Occupancy Category IV.
   2. Seismic Design Category D.
   3. Site Class D, $S_s$ = 0.361g, $S_1$ = 0.07g, $S_{bs}$ = 0.364g, $S_{D1}$ = 0.112g.
   4. $I_P$ = 1.5.

B. Design seismic restraint system under direct supervision of an experienced Professional Engineer licensed in the State of New York.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

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# SECTION 01 41 60
# WIND LOAD DESIGN CRITERIA

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Wind load design criteria for exterior mechanical and electrical components.

### 1.2 DESIGN CRITERIA

A. Design systems to withstand wind loads in accordance with International Building Code latest edition. Deflection limits, if any, are shown in the related technical specification Sections for the systems involved.

B. Wind Loads:

1. Basic Wind Speed (3 second gust) = 105 mph (168 kmph).
2. lw = 1.15.
3. Building Occupancy Category IV.
4. Exposure Category C.
5. Design of components shall be per IBC latest edition and ASCE 7.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

- - - E N D - - -

# SECTION 01 42 19
# REFERENCE STANDARDS

## PART 1 – GENERAL

### 1.1 DESCRIPTIONS

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 may be examined at the following location:

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

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

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

| | |
|---|---|
| AA | Aluminum Association Inc.<br>http://www.aluminum.org |
| AABC | Associated Air Balance Council<br>http://www.aabchq.com |
| AAMA | American Architectural Manufacturer's Association<br>http://www.aamanet.org |
| AAN | American Nursery and Landscape Association<br>http://www.anla.org |
| AASHTO | American Association of State Highway and Transportation Officials<br>http://www.aashto.org |
| AATCC | American Association of Textile Chemists and Colorists<br>http://www.aatcc.org |
| ACGIH | American Conference of Governmental Industrial Hygienists<br>http://www.acgih.org |
| ACI | American Concrete Institute<br>http://www.aci-int.net |
| ACPA | American Concrete Pipe Association<br>http://www.concrete-pipe.org |
| ACPPA | American Concrete Pressure Pipe Association<br>http://www.acppa.org |
| ADC | Air Diffusion Council<br>http://flexibleduct.org |
| AGA | American Gas Association<br>http://www.aga.org |
| AGC | Associated General Contractors of America<br>http://www.agc.org |
| AGMA | American Gear Manufacturers Association, Inc.<br>http://www.agma.org |
| AHAM | Association of Home Appliance Manufacturers<br>http://www.aham.org |
| AISC | American Institute of Steel Construction<br>http://www.aisc.org |

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|---|---|
| AISI | American Iron and Steel Institute<br>http://www.steel.org |
| AITC | American Institute of Timber Construction<br>http://www.aitc-glulam.org |
| AMCA | Air Movement and Control Association, Inc.<br>http://www.amca.org |
| ANLA | American Nursery & Landscape Association<br>http://www.anla.org |
| ANSI | American National Standards Institute, Inc.<br>http://www.ansi.org |
| APA | The Engineered Wood Association<br>http://www.apawood.org |
| ARI | Air-Conditioning and Refrigeration Institute<br>http://www.ari.org |
| ASAE | American Society of Agricultural Engineers<br>http://www.asae.org |
| ASCE | American Society of Civil Engineers<br>http://www.asce.org |
| ASHRAE | American Society of Heating, Refrigerating, and Air-Conditioning Engineers<br>http://www.ashrae.org |
| ASME | American Society of Mechanical Engineers<br>http://www.asme.org |
| ASSE | American Society of Sanitary Engineering<br>http://www.asse-plumbing.org |
| ASTM | American Society for Testing and Materials<br>http://www.astm.org |
| AWI | Architectural Woodwork Institute<br>http://www.awinet.org |
| AWS | American Welding Society<br>http://www.aws.org |
| AWWA | American Water Works Association<br>http://www.awwa.org |
| BHMA | Builders Hardware Manufacturers Association<br>http://www.buildershardware.com |
| BIA | Brick Institute of America<br>http://www.bia.org |

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|---|---|
| CAGI | Compressed Air and Gas Institute<br>http://www.cagi.org |
| CGA | Compressed Gas Association, Inc.<br>http://www.cganet.com |
| CI | The Chlorine Institute, Inc.<br>http://www.chlorineinstitute.org |
| CISCA | Ceilings and Interior Systems Construction Association<br>http://www.cisca.org |
| CISPI | Cast Iron Soil Pipe Institute<br>http://www.cispi.org |
| CLFMI | Chain Link Fence Manufacturers Institute<br>http://www.chainlinkinfo.org |
| CPMB | Concrete Plant Manufacturers Bureau<br>http://www.cpmb.org |
| CRA | California Redwood Association<br>http://www.calredwood.org |
| CRSI | Concrete Reinforcing Steel Institute<br>http://www.crsi.org |
| CTI | Cooling Technology Institute<br>http://www.cti.org |
| DHI | Door and Hardware Institute<br>http://www.dhi.org |
| EGSA | Electrical Generating Systems Association<br>http://www.egsa.org |
| EEI | Edison Electric Institute<br>http://www.eei.org |
| EPA | Environmental Protection Agency<br>http://www.epa.gov |
| ETL | ETL Testing Laboratories, Inc.<br>http://www.et1.com |
| FAA | Federal Aviation Administration<br>http://www.faa.gov |
| FCC | Federal Communications Commission<br>http://www.fcc.gov |
| FPS | The Forest Products Society<br>http://www.forestprod.org |

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|---|---|
| GANA | Glass Association of North America<br>http://www.cssinfo.com/info/gana.html/ |
| FM | Factory Mutual Insurance<br>http://www.fmglobal.com |
| GA | Gypsum Association<br>http://www.gypsum.org |
| GSA | General Services Administration<br>http://www.gsa.gov |
| HI | Hydraulic Institute<br>http://www.pumps.org |
| HPVA | Hardwood Plywood & Veneer Association<br>http://www.hpva.org |
| ICBO | International Conference of Building Officials<br>http://www.icbo.org |
| ICEA | Insulated Cable Engineers Association Inc.<br>http://www.icea.net |
| \ICAC | Institute of Clean Air Companies<br>http://www.icac.com |
| IEEE | Institute of Electrical and Electronics Engineers<br>http://www.ieee.org\ |
| IMSA | International Municipal Signal Association<br>http://www.imsasafety.org |
| IPCEA | Insulated Power Cable Engineers Association |
| NBMA | Metal Buildings Manufacturers Association<br>http://www.mbma.com |
| MSS | Manufacturers Standardization Society of the Valve and Fittings Industry Inc.<br>http://www.mss-hq.com |
| NAAMM | National Association of Architectural Metal Manufacturers<br>http://www.naamm.org |
| NAPHCC | Plumbing-Heating-Cooling Contractors Association<br>http://www.phccweb.org.org |
| NBS | National Bureau of Standards<br>See - NIST |
| NBBPVI | National Board of Boiler and Pressure Vessel Inspectors<br>http://www.nationboard.org |

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| 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 |

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|---|---|
| RIS | Redwood Inspection Service<br>See - CRA |
| RMA | Rubber Manufacturers Association, Inc.<br>http://www.rma.org |
| SCMA | Southern Cypress Manufacturers Association<br>http://www.cypressinfo.org |
| SDI | Steel Door Institute<br>http://www.steeldoor.org |
| IGMA | Insulating Glass Manufacturers Alliance<br>http://www.igmaonline.org |
| SJI | Steel Joist Institute<br>http://www.steeljoist.org |
| SMACNA | Sheet Metal and Air-Conditioning Contractors<br>National Association, Inc.<br>http://www.smacna.org |
| SSPC | The Society for Protective Coatings<br>http://www.sspc.org |
| STI | Steel Tank Institute<br>http://www.steeltank.com |
| SWI | Steel Window Institute<br>http://www.steelwindows.com |
| TCA | Tile Council of America, Inc.<br>http://www.tileusa.com |
| TEMA | Tubular Exchange Manufacturers Association<br>http://www.tema.org |
| TPI | Truss Plate Institute, Inc.<br>583 D'Onofrio Drive; Suite 200<br>Madison, WI 53719<br>(608) 833-5900 |
| UBC | The Uniform Building Code<br>See ICBO |
| UL | Underwriters' Laboratories Incorporated<br>http://www.ul.com |
| ULC | Underwriters' Laboratories of Canada<br>http://www.ulc.ca |

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

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

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

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# SECTION 01 45 29
# TESTING LABORATORY SERVICES

## PART 1 - GENERAL

### 1.1 DESCRIPTION

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

### 1.2 APPLICABLE PUBLICATIONS

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

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

C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field

C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

C138/C138M-10b.....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

C140-12.....Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C143/C143M-10a.....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b.....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C567/C567M-11.....Standard Test Method for Density Structural Lightweight Concrete

C780-11.....Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C1019-11.....Standard Test Method for Sampling and Testing Grout

C1064/C1064M-11.....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c.....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1314-11a.....Standard Test Method for Compressive Strength of Masonry Prisms

D1188-07e1.....Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

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

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3 (2,700 KNm/m3))

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E164-08.....Standard Practice for Contact Ultrasonic Testing of Weldments

E329-11c.....Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

E543-09.....Standard Specification for Agencies Performing Non-Destructive Testing

E605-93(R2011).....Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members

E709-08.....Standard Guide for Magnetic Particle Examination

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

C. American Welding Society (AWS):

D1.D1.1M-10.....Structural Welding Code-Steel

**1.3 REQUIREMENTS**

A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory’s scope of accreditation must include

the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by COTR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COTR to such failure.

C. Written Reports: Testing laboratory shall submit test reports to COTR, Contractor, unless other arrangements are agreed to in writing by the COTR. Submit reports of tests that fail to meet construction contract requirements on colored paper.

D. Verbal Reports: Give verbal notification to COTR immediately of any irregularity.

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

**PART 3 - EXECUTION**

**3.1 CONCRETE**

A. Field Inspection and Materials Testing:

1. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.
2. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 $m^3$ (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. Label each cylinder

with an identification number. COTR may require additional cylinders to be molded and cured under job conditions.

3. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
4. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 $m^3$ (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 $m^3$ (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
5. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
6. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
7. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
8. Verify that specified mixing has been accomplished.
9. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
   a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
   b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
10. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs,

and grade of steel prior to concrete placement. Submit detailed report of observations.

11. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
12. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
13. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
14. Observe preparations for placement of concrete:
    a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
    b. Inspect preparation of construction, expansion, and isolation joints.
15. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
16. Observe Concrete Mixing:
    a. Monitor and record amount of water added at project site.
    b. Observe minimum and maximum mixing times.
17. Measure concrete flatwork for levelness and flatness as follows:
    a. Perform Floor Tolerance Measurements $F_F$ and $F_L$ in accordance with ASTM E1155. Calculate the actual overall F- numbers using the inferior/superior area method.
    b. Perform all floor tolerance measurements within 48 hours after slab installation and prior to removal of shoring and formwork.
    c. Provide the Contractor and the COTR with the results of all profile tests, including a running tabulation of the overall $F_F$ and $F_L$ values for all slabs installed to date, within 72 hours after each slab installation.

B. Laboratory Tests of Field Samples:

1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by COTR. Compile laboratory test reports as follows: Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or

testing, in which case it shall be discarded and strength of spare cylinder shall be used.

2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
3. Furnish certified compression test reports (duplicate) to COTR. In test report, indicate the following information:
   a. Cylinder identification number and date cast.
   b. Specific location at which test samples were taken.
   c. Type of concrete, slump, and percent air.
   d. Compressive strength of concrete in MPa (psi).
   e. Weight of lightweight structural concrete in kg/m$^3$ (pounds per cubic feet).
   f. Weather conditions during placing.
   g. Temperature of concrete in each test cylinder when test cylinder was molded.
   h. Maximum and minimum ambient temperature during placing.
   i. Ambient temperature when concrete sample in test cylinder was taken.
   j. Date delivered to laboratory and date tested.

**3.2 MASONRY**

A. Mortar Tests:
   1. Laboratory compressive strength test:
      a. Comply with ASTM C780.
      b. Obtain samples during or immediately after discharge from batch mixer.
      c. Furnish molds with 50 mm (2 inch), 3 compartment gang cube.
      d. Test one sample at 7 days and 2 samples at 28 days.
   2. Two tests during first week of operation; one test per week after initial test until masonry completion.

B. Grout Tests:
   1. Laboratory compressive strength test:
      a. Comply with ASTM C1019.
      b. Test one sample at 7 days and 2 samples at 28 days.
      c. Perform test for each 230 m$^2$ (2500 square feet) of masonry.

C. Masonry Unit Tests:
   1. Laboratory Compressive Strength Test:
      a. Comply with ASTM C140.

b. Test 3 samples for each 460 $m^2$ (5000 square feet) of wall area.

D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 460 $m^2$ (5000 square feet) of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

**3.3 SPRAYED-ON FIREPROOFING**

A. Provide field inspection and testing services to certify sprayed-on fireproofing has been applied in accordance with contract documents.

B. Obtain a copy of approved submittals from Resident Engineer.

C. Use approved installation in test areas as criteria for inspection of work.

D. Test sprayed-on fireproofing for thickness and density in accordance with ASTM E605.

1. Thickness gauge specified in ASTM E605 may be modified for pole extension so that overhead sprayed material can be reached from floor.

E. Location of test areas for field tests as follows:

1. Thickness: Select one bay per floor, or one bay for each 930 $m^2$ (10,000 square feet) of floor area, whichever provides for greater number of tests. Take thickness determinations from each of following locations: Metal deck, beam, and column.
2. Density: Take density determinations from each floor, or one test from each 930 $m^2$ (10,000 square feet) of floor area, whichever provides for greater number of tests, from each of the following areas: Underside of metal deck, beam flanges, and beam web.

F. Submit inspection reports, certification, and instances of noncompliance to Resident Engineer.

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# SECTION 01 57 19
# TEMPORARY ENVIRONMENTAL CONTROLS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Effect other species of importance to humankind, or;
4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:

1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
7. Sanitary Wastes:
   a. Sewage: Domestic sanitary sewage and human and animal waste.
   b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

**1.2 QUALITY CONTROL**

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

**1.3 REFERENCES**

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
B. New York City Department of Environmental Protection (NYC DEP):
   310 CMR 19.017.....Waste Disposal Ban Regulations
   310 CMR 30.000.....NYC Hazardous Waste Regulations
C. Occupational Safety and Health Administration (OSHA):
   29 CFR 1910.....Occupational Safety and Health Standards
   29 CFR 1926.....Safety and Health Regulations for Construction
D. U.S. National Archives and Records Administration (NARA):
   33 CFR 328.....Definitions

**1.4 SUBMITTALS**

A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
   1. Environmental Protection Plan: After the contract is awarded and prior to the 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. 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.
e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, soil, and historical resources.
g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
h. Permits, licenses, and the location of the solid waste disposal area.
i. 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.

**1.5 PROTECTION OF ENVIRONMENTAL RESOURCES**

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut,

deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Resident Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
   a. Box and protect from damage existing trees and shrubs to remain on the construction site.
   b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
   c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
3. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
4. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
5. Handle discarded materials other than those included in the solid waste category as directed by the Resident Engineer.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to

control water pollution by the listed construction activities that are included in this contract.

1. Monitor water areas affected by construction.

D. Protection of Life Forms: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, and injury to any life forms. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

E. 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 City of New York and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
2. Particulates Control: Maintain all stockpiles, permanent and temporary access roads, plant sites, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

F. 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 9:00 a.m. and 3:00 p.m. unless otherwise permitted by local ordinance or 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 | |
|---|---|---|---|
| FRONT LOADERS | 75 | CONCRETE MIXERS | 75 |
| GENERATORS | 75 | CONCRETE PUMPS | 75 |
| COMPRESSORS | 75 | CRANES | 75 |
| TRUCKS | 75 | SAWS | 75 |
| | | PNEUMATIC TOOLS | 80 |
| PUMPS | 75 | VIBRATORS | 75 |

   b. Use shields or other physical barriers to restrict noise transmission.
   c. Provide soundproof housings or enclosures for noise-producing machinery.
   d. Use efficient silencers on equipment air intakes.
   e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
   f. Line hoppers and storage bins with sound deadening material.
   g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

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 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Resident Engineer noting any problems and the alternatives for mitigating actions.

G. 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.

H. 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

### 1.1 DESCRIPTION

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 73 29
# CUTTING AND PATCHING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies the provisions for the rehabilitation and renovations of existing spaces and materials, both interior and exterior.

### 1.2 RELATED WORK

A. Provide and coordinate all necessary work and products meeting the requirements associated with all applicable specification sections and plans to produce a system complete, functional and ready for the purpose intended. No statements herein shall relieve the Contractor of responsibilities described elsewhere in the contract documents.

B. Section 01 00 00, GENERAL REQUIREMENTS.

C. Section 02 41 00, DEMOLITION: Removal and storage of products to be reinstalled.

D. Individual Specification Sections:

1. Cutting and patching incidental to work of the Section.
2. Advance notification to other Sections of openings required in work of those Sections.
3. Limitations on cutting structural members.
4. Requirements and limitations for cutting and patching of work.

### 1.3 SUBMITTALS

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

B. Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of the Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance or safety of any operational element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate contractor.

C. Include in request:

1. Identification of the Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.

7. Written permission of affected separate contractor.
8. Date and time work will be executed.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. New Materials: As specified in individual Sections.
B. Match existing products and work for patching and extending work.
C. Determine type and quality of existing products by inspection and any necessary testing and workmanship by use of existing as a standard. Presence of a product, finish or type of work, requires that patching, extending or matching shall be performed as necessary to make work complete and consistent with existing quality.
D. Use materials whose installed performance will equal or surpass that of existing materials.

**PART 3 - EXECUTION**

**3.1 GENERAL**

A. All surfaces within the contract limits are to be patched, refinished and painted with materials comparable to the existing surface unless otherwise noted or directed by the VA Project Engineer. Finished surfaces are to be indistinguishable from the surrounding area.
B. All work is to be performed within approved tolerances, meet the requirements of the manufacturer and be neat, straight, plumb, level, smooth.
C. Execute cutting, fitting and patching to complete work and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install ill-timed work.
   3. Remove and replace defective and non-conforming work.
   4. Remove samples of installed work for testing.
   5. Provide openings in elements for penetrations of mechanical and electrical work.
   6. Locate concrete slab cores between concrete ribs.

**3.2 INSPECTION**

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
B. Verify that demolition is complete and areas are ready for installation of new work.
C. After uncovering, inspect conditions affecting performance or work.

D. Beginning of cutting or patching means acceptance of existing conditions.

**3.3 PREPARATION**

A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Cut, move or remove items as necessary for access to alterations and renovations work; replace and restore at completion.

D. Remove unsuitable material not marked for salvage, such as rotted wood, rusted metals and deteriorated masonry and concrete; replace materials as specified for finished work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.

G. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

H. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

**3.4 INSTALLATION**

A. Coordinate work of alterations and renovations to expedite completion and to accommodate Owner occupancy.

B. Remove, cut and patch work in a manner to minimize damage and to provide means of restoring products and finishes to original and/or specified condition.

**3.5 TRANSITIONS**

A. Where new work abuts or aligns with existing, make a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.

B. The elevation of existing finished floors varies from room to room. Where such variations occur grind the concrete topping and repair the floors to create a uniform level surface with the surrounding area.

C. The plane of existing surfaces varies from room to room. Where such variations occur, grind/finish the existing surfaces/partitions to create a uniform plumb surface with the surrounding surface. Where the partition separating rooms has been removed create a uniform level surface with the surrounding area. Where new partitions form a

continuation of an existing surface the finish face of the partition shall align with and be indistinguishable from the existing surface.

D. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation for Resident Engineer review.

E. Where a new partition will form a continuation of an existing surface, the finish face of the new partition shall align with and be indistinguishable from the existing surface. Extend existing to remain partition and utility chase wall assemblies to underside of slab above ceiling line using materials to match existing.

**3.6 ADJUSTMENTS**

A. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

B. Where removal of surfaces/partitions results in adjacent spaces becoming one, rework floors, walls and ceilings to a smooth elevation/plane without breaks, steps or bulkheads.

C. Where a change of elevation/plane of 1/4-inch or more occurs, submit recommendation for providing a smooth transition for Resident Engineer review.

D. Trim existing doors as necessary to clear new floor finishes; refinish trimmed areas.

**3.7 PERFORMANCE**

A. Execute work by methods to avoid damage to other work and which will provide proper surfaces to receive patching and finishing.

B. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

C. Restore work with new products in accordance with requirements of Contract Documents.

D. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

E. At penetrations of fire-rated wall, ceiling or floor construction, completely seal voids with fire stopping material, full thickness of the construction element.

F. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

**3.8 REPAIR OF DAMAGED SURFACES**

A. Damaged surfaces and items within the contract limits shall be patched, repaired, refinished, painted and/or replaced as necessary with materials comparable to the surrounding material and surface equal to new conditions unless otherwise noted or directed by the VA Project Engineer. Finished surfaces shall be indistinguishable from the surrounding area.

B. Patch or replace existing surfaces that are damaged, lifted, discolored or showing other imperfections.

C. Repair substrate prior to patching finish.

**3.9 FINISHES**

A. Finish surfaces as specified in individual Sections and as indicated on Drawings.

B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

**3.10 CLEANING**

A. In addition to the cleaning requirements in other sections, cleaning shall include daily vacuuming, sweeping, dusting and washing of immediate and adjacent areas as needed.

B. At the completion of new construction, all affected areas shall be cleaned, polished and hygienically sanitized including but not limited to floors, walls, partitions, ceilings (including above removable ceiling systems ceiling tiles), fixtures, lenses, windows, equipment, furniture (built-in or free standing), shelves counters, cabinets, doors, drawers.

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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. Inerts (eg, concrete, masonry and asphalt).
2. Clean dimensional wood and palette wood.
3. Engineered wood products (plywood, particle board and I-joists, etc).
4. Metal products (eg, steel, wire, beverage containers, copper, etc).
5. Cardboard, paper and packaging.
6. Bitumen roofing materials.
7. Plastics (eg, ABS, PVC).
8. Carpet and/or pad.
9. Gypsum board.
10. Insulation.
11. Paint.
12. Fluorescent lamps.

### 1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

**1.3 QUALITY ASSURANCE**

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction/ Demolition waste includes products of the following:
   1. Excess or unusable construction materials.
   2. Packaging used for construction products.
   3. Poor planning and/or layout.
   4. Construction error.
   5. Over ordering.
   6. Weather damage.
   7. Contamination.
   8. Mishandling.
   9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.cwm.wbdg.org provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

**1.4 TERMINOLOGY**

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.

C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.

D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.

E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).

F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.

H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

1. 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. The plan shall include, but not be limited to, the following information:

1. Procedures to be used for debris management.
2. Techniques to be used to minimize waste generation.

3. Analysis of the estimated job site waste to be generated:
   a. List of each material and quantity to be salvaged, reused, recycled.
   b. List of each material and quantity proposed to be taken to a landfill.
4. Detailed description of the Means/Methods to be used for material handling.
   a. On site: Material separation, storage, protection where applicable.
   b. Off site: Transportation means and destination. Include list of materials.
      1) Description of materials to be site-separated and self-hauled to designated facilities.
      2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
   c. The names and locations of mixed debris reuse and recycling facilities or sites.
   d. The names and locations of trash disposal landfill facilities or sites.
   e. Documentation that the facilities or sites are approved to receive the materials.

C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

**1.6 APPLICABLE PUBLICATIONS**

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

B. Environmental Protection Agency (EPA):
40 CFR, Part 260.....Hazardous Waste Regulations

C. NYC Department of Environmental Protection (NYC DEP):
310 CMR 19.017.....Waste Disposal Ban Regulations
310 CMR 30.000.....NYC Hazardous Waste Regulations

**1.7 RECORDS**

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

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

**PART 3 - EXECUTION**

**3.1 COLLECTION**

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

**3.2 DISPOSAL**

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

**3.3 REPORT**

A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates

removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.

C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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# SECTION 01 91 00
# GENERAL COMMISSIONING REQUIREMENTS

## PART 1 - GENERAL

### 1.1 COMMISSIONING DESCRIPTION

A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. Commissioning testing shall be by the Contractor. The Contractor shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.

1. All references to Commissioning Agent (CxA) in the contract documents shall mean the Contractor.

B. Conduct commissioning testing in various sections of the project specifications as required for equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the Division 21, Division 23, and Division 26 series sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.

C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.

D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 23 series sections of the specification, these services are intended to be provided in addition to the training and educational services specified herein.

E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA’s operational needs. The commissioning process shall

encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contact documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations and Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the VA’s operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

**1.2 CONTRACTUAL RELATIONSHIPS**

A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the Resident Engineer as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.

B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA Resident Engineer and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the Resident Engineer and Contractor. It is also the practice of the VA that communications

between other parties of the project (Architect/Engineer) be conducted through the Resident Engineer.

C. Whole Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.

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

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

5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or Resident Engineer, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

**1.3 RELATED WORK**

A. Section 01 00 00, GENERAL REQUIREMENTS.
B. Section 01 32 16.13, NETWORK ANALYSIS SCHEDULES.
C. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
D. Section 21 08 00, COMMISSIONING OF FIRE PROTECTION SYSTEMS.
E. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS.
F. Section 26 08 00, COMMISSIONING OF ELECTRICAL SYSTEMS.

**1.4 SUMMARY**

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

**1.5 ACRONYMS**

| List of Acronyms | |
|---|---|
| Acronym | Meaning |
| A/E | Architect / Engineer Design Team |
| AHJ | Authority Having Jurisdiction |
| ASHRAE | Association Society for Heating Air Condition and Refrigeration Engineers |
| BOD | Basis of Design |
| BSC | Building Systems Commissioning |
| CCTV | Closed Circuit Television |
| CD | Construction Documents |
| CMMS | Computerized Maintenance Management System |
| CO | Contracting Officer (VA) |
| COR | Contracting Officer’s Representative (see also VA-RE) |
| COBie | Construction Operations Building Information Exchange |
| CPC | Construction Phase Commissioning |
| Cx | Commissioning |
| CxA | Commissioning Agent (the Contractor) |

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

## 1.6 DEFINITIONS

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

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

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

**Basis of Design (BOD):** The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

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

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

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

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

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

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

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

**Commissioning Checklists:** Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Owner’s Project Requirements (OPR):** A written document that details the project requirements and the expectations of how the building and its systems will be used and operated. These include project goals,

measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

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

**Precision:** The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

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

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

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

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

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

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

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

**Site Observation Reports (SO):** Reports of site inspections and observations made by the Commissioning Agent. Observation reports are

intended to provide early indication of an installation issue which will need correction or analysis.

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

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

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

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

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

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

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

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

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

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

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

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

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

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

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

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

## 1.7 SYSTEMS TO BE COMMISSIONED

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

B. The following systems will be commissioned as part of this project:

| **Systems To Be Commissioned** | |
|---|---|
| **System** | **Description** |
| **Building Exterior Closure** | |
| Exterior Closure | Exterior wall louvers |
| Roofing | Roof openings (equipment curbs) |
| Note: | The emphasis on commissioning the above building envelope systems is on control of air flow, heat flow, noise, infrared, ultraviolet, rain penetration, moisture, durability, security, reliability, constructability, maintainability, and sustainability. |
| **Fire Suppression** | |
| Fire Sprinkler Systems | Wet pipe system |
| **Plumbing** | |
| Reverse-Osmosis Systems | Packaged Reverse-Osmosis systems |
| **HVAC** | |
| Noise and Vibration Control | Noise and vibration levels for critical equipment such as Air Handlers, Chillers, etc. will be commissioned as part of the system commissioning |
| Direct Digital Control System | Operator Interface Computer, Operator Work Station (including graphics, point mapping, trends, alarms), Network Communications Modules and Wiring, Integration Panels. [DDC Control panels will be commissioned with the systems controlled by the panel] |
| Chilled Water System | Chillers (centrifugal, rotary screw, air-cooled), pumps (primary, secondary, variable primary), VFDs associated with chilled water system components, DDC Control Panels (including integration with Building Control System) |
| Steam/Heating Hot Water System | Heat recovery equipment, condensate recovery, water treatment, controls, interface with facility DDC system. |

| **Systems To Be Commissioned** | |
|---|---|
| **System** | **Description** |
| HVAC Air Handling Systems | Air handling Units, packaged rooftop AHU, Outdoor Air conditioning units, humidifiers, DDC control panels |
| HVAC Ventilation/Exhaust Systems | General exhaust, toilet exhaust, laboratory exhaust, isolation exhaust, room pressurization control systems |
| HVAC Energy Recovery Systems | Heat Wheels, Heat Recovery Loops, AHU Integrated Heat Recovery |
| HVAC Terminal Unit Systems | VAV Terminal Units, CAV terminal units, fan coil units, fin-tube radiation, unit heaters |
| Decentralized Unitary HVAC Systems* | Split-system HVAC systems, controls, interface with facility DDC |
| Unitary Heat Pump Systems** | Water-source heat pumps, controls, interface with facility DDC |
| Humidity Control Systems | Humidifiers, de-humidifiers, controls, interface with facility DDC |
| Hydronic Distribution Systems | Pumps, DDC control panels, heat exchangers, |
| **Electrical** | |
| Grounding & Bonding Systems | Witness 3rd party testing, review reports |
| Low-Voltage Distribution System | Normal power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, distribution panels, panelboards, verify breaker testing results (injection current, etc) |
| Lighting & Lighting Control Systems | Emergency lighting, occupancy sensors, lighting control systems |
| | |

## 1.8 COMMISSIONING TEAM

A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA).

1. Commissioning Agent: The Contractor.

B. Members Appointed by Contractor:

1. Contractor' Commissioning Manager: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
2. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she

represents, explicitly organized to implement the commissioning process through coordinated actions.

C. Members Appointed by VA:
   1. User: Representatives of the facility user and operation and maintenance personnel.
   2. A/E: Representative of the Architect and engineering design professionals.

**1.9 VA'S COMMISSIONING RESPONSIBILITIES**

A. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
   1. Coordination meetings.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Testing meetings.
   4. Witness and assist in Systems Functional Performance Testing.
   5. Demonstration of operation of systems, subsystems, and equipment.

B. Provide the Construction Documents, prepared by Architect and approved by VA, to the Commissioning Agent for use in managing the commissioning process, developing the commissioning plan, systems manuals, and reviewing the operation and maintenance training plan.

**1.10 CONTRACTOR'S COMMISSIONING RESPONSIBILITIES**

A. Organize and lead the commissioning team.

B. The Contractor shall assign a Commissioning Manager to manage commissioning activities of the Contractor, and subcontractors.

C. Prepare the commissioning plan. See Paragraph 1.11 A. of this specification Section for further information.

D. The Contractor shall ensure that the commissioning responsibilities outlined in these specifications are included in all subcontracts and that subcontractors comply with the requirements of these specifications.

E. The Contractor shall ensure that each installing subcontractor shall assign representatives with expertise and authority to act on behalf of the subcontractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

1. Convene and participate in commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Contractor shall prepare and distribute minutes to commissioning team members and attendees within five (5) workdays of the commissioning meeting.
2. Conduct operation and maintenance training sessions in accordance with approved training plans.
3. Verify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
4. Evaluate commissioning issues and commissioning observations identified in the Commissioning Issues Log, field reports, test reports or other commissioning documents. In collaboration with entity responsible for system and equipment installation, recommend corrective action.
5. Participate in meetings to coordinate Systems Functional Performance Testing.
6. Participate in training sessions for VA's operation and maintenance personnel.
7. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures to conduct Systems Functional Performance Testing of installed systems.

F. Review and comment on selected submittals for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.

G. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance

training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.

H. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.

I. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.

J. Coordinate Systems Functional Performance Testing schedule with the Contractor.

K. Witness selected systems startups.

L. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.

M. Witness and document Systems Functional Performance Testing.

N. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

O. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00 GENERAL REQUIREMENTS.

P. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.

Q. Prepare commissioning Field Observation Reports.

R. Prepare the Final Commissioning Report.

S. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

T. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

**1.11 COMMISSIONING DOCUMENTATION**

A. Commissioning Plan: A document, prepared by Commissioning Agent, which outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
3. Identification of systems and equipment to be commissioned.
4. Schedule of Commissioning Coordination meetings.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training.
9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
12. Preliminary Systems Functional Performance Test procedures.

B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space

for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA, Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent shall prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent shall spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

E. Corrective Action Documents: The Commissioning Agent shall document corrective action taken for systems and equipment that fail tests. The

documentation shall include any required modifications to systems and equipment and/or revisions to test procedures, if any. The Commissioning Agent shall witness and document any retesting of systems and/or equipment requiring corrective action and document retest results.

1. The Contractor shall be liable for costs incurred by the VA for retesting; including costs for additional fees to the Architect/ Engineer directly related to retesting of systems and/or equipment.

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

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

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

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

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

H. Addendum to Final Commissioning Report: The Commissioning Agent shall prepare an Addendum to the Final Commissioning Report near the end of the Warranty Period. The Addendum shall indicate whether systems, subsystems, and equipment are complete and continue to perform according to the Contract Documents. The Addendum to the Final Commissioning Report shall include, but is not limited to, the following:
   1. Documentation of deferred and off season test(s) results.
   2. Completed Systems Functional Performance Test Procedures for off season test(s).
   3. Documentation that unresolved system performance issues have been resolved.
   4. Updated Commissioning Issues Log, including status of unresolved issues.
   5. Identification of potential Warranty Claims to be corrected by the Contractor.

I. Systems Manual: The Commissioning Agent shall gather required information and compile the Systems Manual. The Systems Manual shall include, but is not limited to, the following:
   1. Design Narrative, including system narratives, schematics, single-line diagrams, flow diagrams, equipment schedules, and changes made throughout the Project.
   2. Reference to Final Commissioning Plan.
   3. Reference to Final Commissioning Report.
   4. Approved Operation and Maintenance Data as submitted by the Contractor.

**1.12 SUBMITTALS**

A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:
   1. The Commissioning Team: A list of commissioning team members by organization.

2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list shall also provide preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).
3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system’s testing.

B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor’s project team, the Commissioning Agent shall prepare the Final Commissioning Plan as described in this section. The Commissioning Agent shall submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent shall incorporate review comments into the Final Commissioning Plan as directed by the VA.

C. Systems Functional Performance Test Procedure: The Commissioning Agent shall submit preliminary Systems Functional Performance Test Procedures

to the VA for review and comment. The VA will return review comments to the Commissioning Agent. The Commissioning Agent shall incorporate review comments into the Final Systems Functional Test Procedures to be used in Systems Functional Performance Testing.

D. Pre-Functional Checklists: The Commissioning Agent shall submit Pre-Functional Checklists to be completed by the Contractor.

E. Test and Inspection Reports: The Commissioning Agent shall submit test and inspection reports to the VA with copies to the Architect/Engineer.

F. Corrective Action Documents: The Commissioning Agent shall submit corrective action documents to the VA Resident Engineer with copies to the Architect/Engineer.

G. Preliminary Commissioning Report Submittal: The Commissioning Agent shall submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.

H. Final Commissioning Report Submittal: The Commissioning Agent shall submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal shall incorporate comments as directed by the VA.

I. Data for Commissioning:

1. The Commissioning Agent shall request in writing specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

**1.13 COMMISSIONING PROCESS**

A. The Commissioning Agent shall be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA. As directed by the VA, incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.

B. Within ten (10) days of contract award, the Contractor shall designate a specific individual as the Commissioning Manager (CxM) to manage and lead the commissioning effort. The Commissioning Manager shall be the single point of contact and communications for all commissioning related services.

C. Within ten (10) days of contract award, the Contractor shall ensure that each subcontractor designates specific individuals as Commissioning Representatives (CXR) to be responsible for commissioning related tasks. The Contractor shall ensure the designated Commissioning Representatives participate in the commissioning process as team members providing commissioning testing services, equipment operation, adjustments, and corrections if necessary. The Contractor shall ensure that all Commissioning Representatives shall have sufficient authority to direct their respective staff to provide the services required, and to speak on behalf of their organizations in all commissioning related contractual matters.

**1.14 QUALITY ASSURANCE**

A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six (6) months prior to use.

**1.15 COORDINATION**

A. Management: The Commissioning Agent shall coordinate the commissioning activities with the VA. The Commissioning Agent shall submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

B. Scheduling: The Contractor shall work with the VA to incorporate the commissioning activities into the construction schedule. The Contractor shall provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning

activities to allow the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.

C. Initial Schedule of Commissioning Events: The Contractor shall provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan shall provide a format for this schedule. As construction progresses, more detailed schedules shall be developed by the Contractor.

D. Commissioning Coordinating Meetings: The Contractor shall conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.

F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

## PART 2 - PRODUCTS

### 2.1 TEST EQUIPMENT

A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing shall be identified in the detailed System Functional Performance Test Procedure prepared by the Contractor.

B. Data logging equipment and software required to test equipment shall be provided by the Contractor.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 degrees C (1.0 degrees F) and a resolution of + or - 0.1 degrees C (0.2 degrees F). Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

**PART 3 - EXECUTION**

**3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES**

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

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

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

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

| **Acceptance Phase** | | CxA = Commissioning Agent<br>RE = Resident Engineer<br>A/E = Design Arch/Engineer<br>PC = Prime Contractor<br>O&M = Gov't Facility O&M | | | | | L = Lead<br>P = Participate<br>A = Approve<br>R = Review<br>O = Optional |
|---|---|---|---|---|---|---|---|
| Commissioning Roles & Responsibilities | | | | | | | |
| Category | Task Description | CxA | RE | A/E | PC | O&M | Notes |
| Meetings | Commissioning Meetings | L | A | P | P | O | |
| | Project Progress Meetings | P | A | P | L | O | |
| | Pre-Test Coordination Meeting | L | A | P | P | O | |
| | Lessons Learned and Commissioning Report Review Meeting | L | A | P | P | O | |
| | | | | | | | |
| Coordination | Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD | L | P | P | P | O | |
| | | | | | | | |
| Cx Plan & Spec | Maintain/Update Commissioning Plan | L | A | R | R | O | |
| | | | | | | | |
| Schedules | Prepare Functional Test Schedule | L | A | R | R | O | |
| | | | | | | | |
| OPR and BOD | Maintain OPR on behalf of Owner | L | A | R | R | O | |
| | Maintain BOD/DID on behalf of Owner | L | A | R | R | O | |
| | | | | | | | |

| **Acceptance Phase** | | CxA = Commissioning Agent<br>RE = Resident Engineer<br>A/E = Design Arch/Engineer<br>PC = Prime Contractor<br>O&M = Gov't Facility O&M | | | | | L = Lead<br>P = Participate<br>A = Approve<br>R = Review<br>O = Optional |
|---|---|---|---|---|---|---|---|
| Commissioning Roles & Responsibilities | | | | | | | |
| Category | Task Description | CxA | RE | A/E | PC | O&M | Notes |
| Document Reviews | Review Completed Pre-Functional Checklists | L | A | R | R | O | |
| | Pre-Functional Checklist Verification | L | A | R | R | O | |
| | Review Operations & Maintenance Manuals | L | A | R | R | R | |
| | Training Plan Review | L | A | R | R | R | |
| | Warranty Review | L | A | R | R | O | |
| | Review TAB Report | L | A | R | R | O | |
| | | | | | | | |
| Site Observations | Construction Observation Site Visits | L | A | R | R | O | |
| | Witness Selected Equipment Startup | L | A | R | R | O | |
| | | | | | | | |
| Functional Test Protocols | TAB Verification | L | A | R | R | O | |
| | Systems Functional Performance Testing | L | A | P | P | P | |
| | Retesting | L | A | P | P | P | |
| | | | | | | | |
| Technical Activities | Issues Resolution Meetings | P | A | P | L | O | |
| | Systems Training | L | S | R | P | P | |
| | | | | | | | |
| Reports and Logs | Status Reports | L | A | R | R | O | |
| | Maintain Commissioning Issues Log | L | A | R | R | O | |
| | Final Commissioning Report | L | A | R | R | R | |
| | Prepare Systems Manuals | L | A | R | R | R | |

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

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

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

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

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

c. The Commissioning Agent shall submit the full startup plan to the VA for review. Final approval will be by the VA.
d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.

3. Sensor and Actuator Calibration:
   a. All field installed temperature, relative humidity, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described in Division 21 and Division 23 specifications.
   b. All procedures used shall be fully documented on the Pre-Functional Checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
4. Execution of Equipment Startup:
   a. Four (4) weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA. The performance of the startup and checkout shall be directed and executed by the Contractor.
   b. The Contractor shall observe the startup procedures for selected pieces of primary equipment.
   c. The Contractor shall execute startup and provide the VA with a signed and dated copy of the completed startup checklists, and contractor tests.
   d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

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

A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies shall be provided to the VA within two (2) days of completion.
B. The VA will review the report and submit comments to the Contractor. The Contractor shall work to correct and verify deficiencies or

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

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

**3.4 PHASED COMMISSIONING**

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

**3.5 DDC SYSTEM TRENDING FOR COMMISSIONING**

A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.

B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.

1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
2. Priority level alarms are to be printed to a printer which is connected to the Operator’s Work Station located within the engineer’s office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.

3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.

C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.

D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Resident Engineer and Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration shall be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the Resident Engineer. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the Resident Engineer, prior to the execution of Systems Functional Performance Testing.

2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots shall be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend, etc., all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
4. The following tables indicate the points to be trended and alarmed by system. The Operational Trend Duration column indicates the trend duration for normal operations. The Testing Trend Duration column indicates the trend duration prior to Systems Functional Performance Testing and again after Systems Functional Performance Testing. The Type column indicates point type: AI = Analog Input, AO = Analog Output, DI = Digital Input, DO = Digital Output, Calc = Calculated Point. In the Trend Interval Column, COV = Change of Value. The Alarm Type indicates the alarm priority; C = Critical, P = Priority, and M = Maintenance. The Alarm Range column indicates when the point is considered in the alarm state. The Alarm Delay column indicates the length of time the point must remain in an alarm state before the alarm is recorded in the DDC. The intent is to allow minor, short-duration events to be corrected by the DDC system prior to recording an alarm.

| **Dual-Path Air Handling Unit Trending and Alarms** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |

| Dual-Path Air Handling Unit Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| OA Temperature | AI | 15 Min | 24 hours | 3 days | N/A | | |
| RA Temperature | AI | 15 Min | 24 hours | 3 days | N/A | | |
| RA Humidity | AI | 15 Min | 24 hours | 3 days | P | >60% RH | 10 min |
| Mixed Air Temp | AI | None | None | None | N/A | | |
| SA Temp | AI | 15 Min | 24 hours | 3 days | C | ±5°F from SP | 10 min |
| Supply Fan Speed | AI | 15 Min | 24 hours | 3 days | N/A | | |
| Return Fan Speed | AI | 15 Min | 24 hours | 3 days | N/A | | |
| RA Pre-Filter Status | AI | None | None | None | N/A | | |
| OA Pre-Filter Status | AI | None | None | None | N/A | | |
| After Filter Status | AI | None | None | None | N/A | | |
| SA Flow | AI | 15 Min | 24 hours | 3 days | C | ±10% from SP | 10 min |
| OA Supply Temp | AI | 15 Min | 24 hours | 3 days | P | ±5°F from SP | 10 min |
| RA Supply Temp | AI | 15 Min | 24 hours | 3 days | N/A | | |
| RA CHW Valve Position | AI | 15 Min | 24 hours | 3 days | N/A | | |
| OA CHW Valve Position | AI | 15 Min | 24 hours | 3 days | N/A | | |
| OA HW Valve Position | AI | 15 Min | 24 hours | 3 days | N/A | | |
| OA Flow | AI | 15 Min | 24 hours | 3 days | P | ±10% from SP | 5 min |
| RA Flow | AI | 15 Min | 24 hours | 3 days | P | ±10% from SP | 5 min |
| Initial UVC Intensity (%) | AI | None | None | None | N/A | | |
| Duct Pressure | AI | 15 Min | 24 hours | 3 days | C | ±25% from SP | 6 min |
| CO2 Level | AI | 15 Min | 24 hours | 3 days | P | ±10% from SP | 10 min |
| | | | | | | | |
| Supply Fan Status | DI | COV | 24 hours | 3 days | C | Status <> Command | 10 min |

| Dual-Path Air Handling Unit Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Return Fan Status | DI | COV | 24 hours | 3 days | C | Status <> Command | 10 Min |
| High Static Status | DI | COV | 24 hours | 3 days | P | True | 1 min |
| Fire Alarm Status | DI | COV | 24 hours | 3 days | C | True | 5 min |
| Freeze Stat Level 1 | DI | COV | 24 hours | 3 days | C | True | 10 min |
| Freeze Stat Level 2 | DI | COV | 24 hours | 3 days | C | True | 5 min |
| Freeze Stat Level 3 | DI | COV | 24 hours | 3 days | P | True | 1 min |
| Fire/Smoke Damper Status | DI | COV | 24 hours | 3 days | P | Closed | 1 min |
| Emergency AHU Shutdown | DI | COV | 24 hours | 3 days | P | True | 1 min |
| Exhaust Fan #1 Status | DI | COV | 24 hours | 3 days | C | Status <> Command | 10 min |
| Exhaust Fan #2 Status | DI | COV | 24 hours | 3 days | C | Status <> Command | 10 min |
| Exhaust Fan #3 Status | DI | COV | 24 hours | 3 days | C | Status <> Command | 10 min |
| OA Alarm | DI | COV | 24 hours | 3 days | C | True | 10 min |
| High Static Alarm | DI | COV | 24 hours | 3 days | C | True | 10 min |
| UVC Emitter Alarm | DI | COV | 24 hours | 3 days | P | True | 10 min |
| CO2 Alarm | DI | COV | 24 hours | 3 days | P | True | 10 min |
| Power Failure | DI | COV | 24 hours | 3 days | P | True | 1 min |
| | | | | | | | |
| Supply Fan Speed | AO | 15 Min | 24 hours | 3 days | N/A | | |
| Return Fan Speed | AO | 15 Min | 24 hours | 3 days | N/A | | |
| RA CHW Valve Position | AO | 15 Min | 24 hours | 3 days | N/A | | |
| OA CHW Valve Position | AO | 15 Min | 24 hours | 3 days | N/A | | |
| OA HW Valve Position | AO | 15 Min | 24 hours | 3 days | N/A | | |

| Dual-Path Air Handling Unit Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| | | | | | | | |
| Supply Fan S/S | DO | COV | 24 hours | 3 days | N/A | | |
| Return Fan S/S | DO | COV | 24 hours | 3 days | N/A | | |
| Fire/Smoke Dampers | DO | COV | 24 hours | 3 days | N/A | | |
| Exhaust Fan S/S | DO | COV | 24 hours | 3 days | N/A | | |
| Exhaust Fan S/S | DO | COV | 24 hours | 3 days | N/A | | |
| Exhaust Fan S/S | DO | COV | 24 hours | 3 days | N/A | | |
| | | | | | | | |
| AHU Energy | Calc | 1 Hour | 30 day | N/A | N/A | | |
| | | | | | | | |

| Terminal Unit (VAV, CAV, etc.) Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Space Temperature | AI | 15 Min | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| Air Flow | AI | 15 Min | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| SA Temperature | AI | 15 Min | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| Local Setpoint | AI | 15 Min | 12 hours | 3 days | M | ±10°F from SP | 60 min |
| Space Humidity | AI | 15 Min | 12 hours | 3 days | P | > 60% RH | 5 min |
| | | | | | | | |
| Unoccupied Override | DI | COV | 12 hours | 3 days | M | N/A | 12 Hours |
| Refrigerator Alarm | DI | COV | 12 hours | 3 days | C | N/A | 10 min |
| | | | | | | | |
| Damper Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |
| Heating coil Valve Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |

| 4-Pipe Fan Coil Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Space Temperature | AI | 15 Minutes | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| SA Temperature | AI | 15 Minutes | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| Pre-Filter Status | AI | None | None | None | M | > SP | 1 hour |
| | | | | | | | |
| Water Sensor | DI | COV | 12 hours | 3 days | M | N/A | 30 Min |
| | | | | | | | |
| Cooling Coil Valve Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |
| Heating coil Valve Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |
| Fan Coil ON/OFF | DO | COV | 12 hours | 3 days | M | Status <> Command | 30 min |

| 2-Pipe Fan Coil Unit Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Space Temperature | AI | 15 Minutes | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| SA Temperature | AI | 15 Minutes | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| Pre-Filter Status | AI | None | None | None | M | > SP | 1 hour |
| | | | | | | | |
| Water Sensor | DI | COV | 12 hours | 3 days | M | N/A | 30 Min |
| | | | | | | | |
| Cooling Coil Valve Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |
| Fan Coil ON/OFF | DO | COV | 12 hours | 3 days | M | Status <> Command | 30 min |

| Unit Heater Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Space Temperature | AI | 15 Minutes | 12 hours | 3 days | P | ±5°F from SP | 10 min |
| | | | | | | | |
| Heating Valve Position | AO | 15 Minutes | 12 hours | 3 days | N/A | | |
| | | | | | | | |
| Unit Heater ON/OFF | DO | COV | 12 hours | 3 days | M | Status <> Command | 30 min |

| Steam and Condensate Pumps Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Steam Flow (LB/HR) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Condensate Pump Run Hours | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Water Meter (GPM) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Electric Meter (KW/H) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Irrigation Meter (GPM) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Chilled Water Flow (TONS) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| Condensate Flow (GPM) | AI | 15 Minutes | 12 hours | 3 days | N/A | | |
| | | | | | | | |
| High Water Level Alarm | DI | COV | 12 hours | 3 days | C | True | 5 Min |
| | | | | | | | |
| Condensate Pump Start/Stop | DO | COV | 12 hours | 3 days | P | Status <> Command | 10 min |

| Domestic Hot Water Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Domestic HW Setpoint WH-1 | AI | 15 Minute | 12 Hours | 3 days | N/A | | |
| Domestic HW Setpoint WH-2 | AI | 15 Minute | 12 Hours | 3 days | N/A | | |
| Domestic HW Temperature | AI | 15 Minute | 12 Hours | 3 days | C | > 135 oF | 10 Min |
| Domestic HW Temperature | AI | 15 Minute | 12 Hours | 3 days | P | ±5°F from SP | 10 Min |
| | | | | | | | |
| Dom. Circ. Pump #1 Status | DI | COV | 12 Hours | 3 days | M | Status <> Command | 30 min |
| Dom. Circ. Pump #2 Status | DI | COV | 12 Hours | 3 days | M | Status <> Command | 30 min |
| | | | | | | | |
| Dom. Circ. Pump #1 Start/Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Dom. Circ. Pump #2 Start/Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Domestic HW Start/Stop | DO | COV | 12 Hours | 3 days | N/A | | |

| Hydronic Hot Water Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| System HWS Temperature | AI | 15 min | 12 hours | 3 days | C | ±5°F from SP | 10 Min |
| System HWR Temperature | AI | 15 min | 12 hours | 3 days | M | ±15°F from SP | 300 Min |
| HX-1 Entering Temperature | AI | 15 min | 12 hours | 3 days | P | ±5°F from SP | 10 Min |
| HX-2 Entering Temperature | AI | 15 min | 12 hours | 3 days | P | ±5°F from SP | 10 Min |
| HX-2 Leaving Temperature | AI | 15 min | 12 hours | 3 days | P | ±5°F from SP | 10 Min |
| | | | | | | | |
| System Flow (GPM) | AI | 15 min | 12 hours | 3 days | N/A | | |

| Hydronic Hot Water Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| System Differential Pressure | AI | 15 min | 12 hours | 3 days | P | ±10% from SP | 8 Min |
| | | | | 3 days | | | |
| HW Pump 1 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| HW Pump 2 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| | | | | | | | |
| HW Pump 1 VFD Speed | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| HW Pump 2 VFD Speed | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| Steam Station #1 1/3 Control Valve Position | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| Steam Station #1 2/3 Control Valve Position | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| Steam Station #2 1/3 Control Valve Position | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| Steam Station #2 2/3 Control Valve Position | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| Steam Station Bypass Valve Position | AO | 15 Min | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| HW Pump 1 Start/Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| HW Pump 2 Start/Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| HWR #1 Valve | DO | COV | 12 Hours | 3 days | N/A | | |
| HWR #2 Valve | DO | COV | 12 Hours | 3 days | N/A | | |

| Chilled Water System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Chiller 1 Entering Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 1 Leaving Temperature | AI | 15 Minutes | 12 Hours | 3 days | P | ±5°F from SP | 10 Min |
| Chiller 1 Flow | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 1 Percent Load | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 1 KW Consumption | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 1 Tonnage | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Entering Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Leaving Temperature | AI | 15 Minutes | 12 Hours | 3 days | P | ±5°F from SP | 10 Min |
| Chiller 2 Flow | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Percent Load | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 KW Consumption | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Tonnage | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Primary Loop Decoupler Flow | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Primary Loop Flow | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Primary Loop Supply Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Differential Pressure | AI | 15 Minutes | 12 Hours | 3 days | P | ±5% from SP | 10 Min |
| Secondary Loop Flow | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Supply Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |

| Chilled Water System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Secondary Loop Return Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Tonnage | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Primary Loop Pump 1 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Primary Loop Pump 2 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Secondary Loop Pump 1 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Secondary Loop Pump 2 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Chiller 1 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Chiller 1 Evaporator Iso-Valve | DI | COV | 12 Hours | 3 days | N/A | | |
| Chiller 1 Evaporator Flow Switch | DI | COV | 12 Hours | 3 days | N/A | | |
| Chiller 1 Unit Alarm | DI | COV | 12 Hours | 3 days | C | True | 10 Min |
| Chiller 2 Status | DI | COV | 12 Hours | 3 days | C | Status <> Command | 30 min |
| Chiller 2 Evaporator Iso-Valve | DI | COV | 12 Hours | 3 days | N/A | | |
| Chiller 2 Evaporator Flow Switch | DI | COV | 12 Hours | 3 days | N/A | | |
| Chiller 2 Unit Alarm | DI | COV | 12 Hours | 3 days | C | True | 10 Min |
| Refrigerant Detector | DI | COV | 12 Hours | 3 days | C | True | 10 Min |
| Refrigerant Exhaust Fan Status | DI | COV | 12 Hours | 3 days | M | Status <> Command | 30 min |
| Emergency Shutdown | DI | COV | 12 Hours | 3 days | P | True | 1 Min |

| Chilled Water System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| | | | | | | | |
| Primary Loop Pump 1 VFD Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Primary Loop Pump 2 VFD Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Pump 1 VFD Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Pump 2 VFD Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Primary Pump 1 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Primary Pump 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 1 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Chiller 1 Enable | DO | COV | 12 Hours | 3 days | N/A | | |
| Chiller 1 Iso-Valve Command | DO | COV | 12 Hours | 3 days | N/A | | |
| Chiller 2 Enable | DO | COV | 12 Hours | 3 days | N/A | | |
| Chiller 2 Iso-Valve Command | DO | COV | 12 Hours | 3 days | N/A | | |
| Refrigerant Exhaust Fan Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |

| Condenser Water System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Chiller 1 Condenser Entering Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 1 Condenser Leaving Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Condenser Entering Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Condenser Leaving Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Supply Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Return Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Basin Temp | AI | 15 Minutes | 12 Hours | 3 days | P | < 45 oF | 10 Min |
| Cooling Tower 2 Supply Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Return Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Basin Temp | AI | 15 Minutes | 12 Hours | 3 days | P | < 45 oF | 10 Min |
| Condenser Water Supply Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Condenser Water Return Temp | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Outdoor Air Wet Bulb | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Cooling Tower 1 Fan Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| Cooling Tower 1 Basin Heat | DI | COV | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Heat Trace | DI | COV | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Fan Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| Cooling Tower 2 Basin Heat | DI | COV | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Heat Trace | DI | COV | 12 Hours | 3 days | N/A | | |

| **Condenser Water System Trending and Alarms** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Chiller 1 Isolation Valve | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| Chiller 2 Isolation Valve | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| Condenser Water Pump 1 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| Condenser Water Pump 2 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 1 min |
| | | | | | | | |
| Chiller 1 Condenser Bypass Valve | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Chiller 2 Condenser By-Pass Valve | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Bypass Valve | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 1 Fan Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Bypass Valve | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Fan Speed | AO | 15 Minutes | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Cooling Tower 1 Fan Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Cooling Tower 2 Fan Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Condenser Water Pump 1 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Condenser Water Pump 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |

| Steam Boiler System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Boiler 1 Steam Pressure | AI | 15 Minutes | 12 Hours | 3 days | P | ±5% from SP | 10 Min |
| Boiler 1 Steam Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 1 Fire Signal | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 2 Steam Pressure | AI | 15 Minutes | 12 Hours | 3 days | P | ±5% from SP | 10 Min |
| Boiler 2 Steam Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 2 Fire Signal | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| System Steam Pressure | AI | 15 Minutes | 12 Hours | 3 days | P | ±5% from SP | 10 Min |
| | | | | | | | |
| Boiler 1 Enable | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 1 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Boiler 1 Alarm | DI | COV | 12 Hours | 3 days | C | True | 1 Min |
| Boiler 1 on Fuel Oil | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 1 Low Water Alarm | DI | COV | 12 Hours | 3 days | C | True | 5 Min |
| Boiler 1 High Water Alarm | DI | COV | 12 Hours | 3 days | C | True | 5 Min |
| Boiler 1 Feed Pump | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Enable | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Boiler 2 Alarm | DI | COV | 12 Hours | 3 days | C | True | 1 Min |
| Boiler 2 on Fuel Oil | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Low Water Alarm | DI | COV | 12 Hours | 3 days | C | True | 5 Min |
| Boiler 2 High Water Alarm | DI | COV | 12 Hours | 3 days | C | True | 5 Min |

| Steam Boiler System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Boiler 2 Feed Pump | DI | COV | 12 Hours | 3 days | N/A | | |
| Combustion Damper Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 5 min |
| Condensate Recovery Pump Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 5 min |
| | | | | | | | |
| Boiler 1 Feed Pump Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Combustion Damper Command | DO | COV | 12 Hours | 3 days | N/A | | |
| Condensate Recovery Pump Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |

| Hot Water Boiler System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Outside Air Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 1 Fire Signal | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 1 Entering Water Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 1 Leaving Water Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 2 Fire Signal | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Boiler 2 Entering Water Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |

| Hot Water Boiler System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Boiler 2 Leaving Water Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Hot Water Supply Temperature | AI | 15 Minutes | 12 Hours | 3 days | P | ±5 oF from SP | 10 Min |
| Hot Water Return Temperature | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| Secondary Loop Differential Pressure | AI | 15 Minutes | 12 Hours | 3 days | C | ±5% from SP | 10 Min |
| Lead Boiler | AI | 15 Minutes | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Boiler 1 Enable | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 1 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Boiler 1 Isolation Valve | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 1 on Fuel Oil | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 1 Alarm | DI | COV | 12 Hours | 3 days | C | True | 1 Min |
| Boiler 2 Enable | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Boiler 2 Isolation Valve | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 on Fuel Oil | DI | COV | 12 Hours | 3 days | N/A | | |
| Boiler 2 Alarm | DI | COV | 12 Hours | 3 days | C | True | 1 Min |
| Combustion Dampers Open | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Primary Pump 1 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |

| Hot Water Boiler System Trending and Alarms | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Point** | **Type** | **Trend Interval** | **Operational Trend Duration** | **Testing Trend Duration** | **Alarm Type** | **Alarm Range** | **Alarm Delay** |
| Primary Pump 2 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Secondary Pump 1 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| Secondary Pump 2 Status | DI | COV | 12 Hours | 3 days | P | Status <> Command | 10 min |
| | | | | | | | |
| Primary Pump 1 VFD Speed | AO | COV | 12 Hours | 3 days | N/A | | |
| Primary Pump 2 VFD Speed | AO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 1 VFD Speed | AO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 2 VFD Speed | AO | COV | 12 Hours | 3 days | N/A | | |
| | | | | | | | |
| Hot Water System Enable | DO | COV | 12 Hours | 3 days | N/A | | |
| Combustion Dampers Command | DO | COV | 12 Hours | 3 days | N/A | | |
| Primary Pump 1 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Primary Pump 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 1 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |
| Secondary Pump 2 Start / Stop | DO | COV | 12 Hours | 3 days | N/A | | |

E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the Resident Engineer.

1. Point-to-Point checkout documentation;

2. Sensor field calibration documentation including system name, sensor/point name, measured value, DDC value, and Correction Factor.
3. A sensor calibration table listing the referencing the location of procedures to following in the O&M manuals, and the frequency at which calibration should be performed for all sensors, separated by system, subsystem, and type. The calibration requirements shall be submitted both in the O&M manuals and separately in a standalone document containing all sensors for inclusion in the commissioning documentation. The following table is a sample that can be used as a template for submission.

| **SYSTEM** | | |
|---|---|---|
| **Sensor** | **Calibration Frequency** | **O&M Calibration Procedure Reference** |
| Discharge air temperature | Once a year | Volume I Section D.3.aa |
| Discharge static pressure | Every 6 months | Volume II Section A.1.c |

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.

| **AIR HANDLING UNIT AHU-1** | | | | |
|---|---|---|---|---|
| Control Reference | Proportional Constant | Integral Constant | Derivative Constant | Interval |
| Heating Valve Output | 1000 | 20 | 10 | 2 sec. |

## 3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING

A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.

B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion

to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

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

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

1. System and equipment or component name(s).
2. Equipment location and ID number.

3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment.
4. Date.
5. Project name.
6. Participating parties.
7. A copy of the specification section describing the test requirements.
8. A copy of the specific sequence of operations or other specified parameters being verified.
9. Formulas used in any calculations.
10. Required pretest field measurements.
11. Instructions for setting up the test.
12. Special cautions, alarm limits, etc.
13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format.
14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
15. A section for comments.
16. Signatures and date block for the Contractor to signify attendance at the test.

E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor shall determine which method is most appropriate for tests that do not have a method specified.

1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a

system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable (e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response). Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

3. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
4. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 degrees C (54 degrees F), when the outside air temperature is above 12 degrees C (54 degrees F), temporarily change the lockout setpoint to be 2 degrees C (4 degrees F) above the current outside air temperature.
5. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc., to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.

G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent shall determine the

sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.

H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

I. Coordination and Scheduling: The Contractor shall provide a minimum of seven (7) days' notice to the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Contractor shall schedule Systems Functional Performance Tests with the VA. The Contractor shall witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.

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

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

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

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

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

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of non-compliance, and the Contractor accepts responsibility to correct it:
   a. The Commissioning Agent shall document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent shall submit a Commissioning Field Report to the VA. The Commissioning Agent shall also note items of noncompliance and the Contractor’s response in the Master Commissioning Issues Log. The Contractor shall correct the item

of noncompliance and report completion to the VA and the Commissioning Agent.

b. The need for retesting shall be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.

5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:

a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor’s response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.

b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.

c. The Commissioning Agent shall document the resolution process.

d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting shall be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.

C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by

the VA. In such case, the Contractor shall provide the VA with the following:

1. Within one (1) week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two (2) weeks of the original notice.
2. Within two (2) weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc., and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one (1) week, upon which the VA will decide whether to accept the solution.
5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one (1) week from when parts can be obtained.

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

**3.8 DEFERRED TESTING**

A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests

shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.

B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent shall review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

**3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS**

A. Training Preparation Conference: Before operation and maintenance training, the Commissioning Agent shall convene a training preparation conference to include VA's Resident Engineer, VA’s Operations and Maintenance personnel, and the Contractor. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.

B. The Contractor shall provide training and demonstration as required by other Division 23 and Division 34 sections. The Training and Demonstration shall include, but is not limited to, the following:

1. Review the Contract Documents.
2. Review installed systems, subsystems, and equipment.
3. Review instructor qualifications.
4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Review and discuss locations and other facilities required for instruction.

8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
9. When instruction must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
1. Instruction Program: Submit two (2) copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
2. Qualification Data: Submit qualifications for facilitator and/or instructor.
3. Attendance Record: For each training module, submit list of participants and length of instruction time.
4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
5. Demonstration and Training Recording:
   a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
   b. Video Format: Provide high quality color DVD color on standard size DVD disks.
   c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
   d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage

point, indicating location, direction (by compass point), and elevation or story of construction.

e. Submit two (2) copies within seven (7) days of end of each training module.

6. Transcript: Prepared on 8-1/2 by 11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

D. Quality Assurance:

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

E. Training Coordination:

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

F. Instruction Program:

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

a. Heat generation, including boilers, feedwater equipment, pumps, steam distribution piping, condensate return systems, heating hot water heat exchangers, and heating hot water distribution piping.
b. Refrigeration systems, including chillers, cooling towers, condensers, pumps, and distribution piping.
c. HVAC systems, including air handling equipment, air distribution systems, and terminal equipment and devices.
d. HVAC instrumentation and controls.

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

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   H, Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project Record Documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

H. Training Execution:
1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.
2. Instruction:
   a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.
   b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
      2) The VA will furnish an instructor to describe VA's operational philosophy.
      3) The VA will furnish the Contractor with names and positions of participants.
3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven (7) days' advance notice.
4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.

5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

I. Demonstration and Training Recording:

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
2. Video Format: Provide high quality color DVD color on standard size DVD disks.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

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# SECTION 01 99 99
# PROJECT CLOSEOUT

## PART 1 – GENERAL

### 1.1 DESCRIPTION OF REQUIREMENTS

A. Definitions: Closeout is hereby defined to include general requirements near the end of contract duration, in preparation for final acceptance, final payment, normal termination of contract, occupancy and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in Sections of Division 02 through 34 as applicable.

B. Time of closeout is directly related to “Substantial Completion”, and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been noted as substantially complete at different dates, that time variation (if any) shall be applicable to other provisions of this section.

### 1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. General: Two (2) weeks prior to requesting inspection of “substantial completion” (for either entire work or portions thereof), complete the following and list exceptions:

1. List “substantially complete” areas for portion claimed with certifications and supporting documentation in accordance with the contract documents (properly installed and ready for operation), and itemize incomplete items (Contractor issued final “Punch List”), value of incomplete work, and reasons for being incomplete with supporting documentation.
2. No GWB/SAT ceiling material shall be installed in the project area until “all” work above the ceiling line has been completed, tested, inspected, approved and accepted by specified agents and the VA Resident Engineer in advance with “all” associated test/inspection reports issued demonstrating compliance with the contract requirements.
3. Complete start-up testing of systems, and instructions to Government’s operating/maintenance personnel. Discontinue (or change over) and remove from project site temporary facilities and services, along with construction tools, equipment, and similar elements.

B. Inspection: Upon receipt of Contractor's request, the Contracting Officer will either proceed with inspection or advise Contractor that prerequisites are not fulfilled. Following initial inspection, the Contracting Officer will either approve "substantial completion", or issue a "Deficiency Report" itemizing work which must be performed and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspections ("Deficiency Report") will form the basis of the "Punch List" to be completed for final acceptance.

**1.3 PREREQUISITES TO FINAL ACCEPTANCE**

A. General: Prior to requesting final inspection for final acceptance and final payment, as required by General Provisions and Conditions, complete the following and list known exceptions (if any) …

1. Submit final payment request with final releases and supporting documentation not previously submitted and accepted.
2. Submit copy of Contractor final Punch List including resolution of Deficiency Reports resulting from earlier inspections stating that each item has been completed, resolved or otherwise delayed for acceptable circumstances with supporting documentation.
3. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
4. Submit record documents in the format specified.
5. Submit final record information (e.g., electrical panel schedule, equipment data sheets).
6. Provide tools, spare parts, extra stocks of materials, and similar physical items.
7. Make final change-over of locks and transmit keys to the Contracting Officer and advise Government personnel of change-over in security provisions.
8. Complete final cleaning up requirements, including touch-up painting of marred surfaces.
9. Touch-up and otherwise repair and restore marred exposed finishes.

B. Re-inspection: Upon receipt of Contractor's notice that all work has been completed, including resolution of Deficiency Reports resulting from earlier inspections, the Contracting Officer will re-inspect the work. Upon completion of re-inspection, the Contracting Officer will either proceed to final acceptance or issue a Punch List itemizing work

not completed and obligations not fulfilled as required for final acceptance. If necessary, re-inspection will be repeated until work is accepted.

**1.4 RECORD DOCUMENTS**

A. General: As work progresses, prepare and maintain record documents as specified herein. Each record shall be certified by the General Contractor. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location accessible to the Contracting Office for reference during normal working hours. Upon completion, turn record documents over to the Contracting Officer.

B. Record Drawings: Maintain a white-print set (blue-line or black-line) of contract drawings (including amendment and change order drawings) and shop drawings in clean, undamaged condition, with mark-up of actual installations which vary from the work as originally shown. Mark whichever drawing is most capable of showing “field” condition fully and accurately; however, where shop drawings are used for mark-up, record a cross-reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance, but was for some reason not shown on either contract drawings or shop drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related CO (change order) and/or RFI numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on cover of each set.

1. Four (4) weeks prior to the final inspection, the Contractor shall provide the VA Project Engineer with eight (8) complete sets (4 full size, 4 reduced size) of CAD quality drawings on vellum (reproducible, clean and legible).
2. AutoCAD (verify required version) files in the format consistent with the VA’s standards on PC CD disks with all the above information incorporated.
3. Adobe Acrobat PDF files for each AutoCAD file on PC CD disks with all the above information incorporated.

4. The draftsmanship and information shall be comparable in all ways to the original documents, and shall be dated and noted “As-Built”.

C. Record Specifications: Maintain one (1) copy of specifications, including amendments, change orders and similar modifications issued in printed form during construction, and mark-up variations in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a late date by direct observation. Note related record drawing information and product data, where applicable.

D. Record Product Data, Certifications and Laboratory Test Reports: Maintain one copy of each product data submittal, product certification, and laboratory test report and mark-up significant variations in actual work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be easily discerned at a later date by direct observation. Note related change orders and mark-up of record drawings and specifications.

E. Record Samples and Salvaged Items: Immediately prior to date(s) of substantial completion, the Contacting Officer or designated representative will meet with Contractor on site, and will determine which (if any) of submitted samples and salvaged items maintained by Contractor during progress of the work are to be retained by the Government. Comply with the Resident Engineers instructions for packaging, identification marking, and delivery.

F. Miscellaneous Record Submittals: Refer to other Sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to date(s) of substantial completion, complete miscellaneous records and place in good order, appropriately identified and bound, ready for continued use and reference. Turn over to the Contacting Officer prior to final acceptance.

**1.5 OPERATION AND MAINTENANCE MANUALS**

A. General: Submit in accordance with Article, INSTRUCTION MANUALS, in Section 01 00 00, GENERAL REQUIREMENTS, 3 sets of operation and

maintenance manuals (with parts/shop/service details) for each mechanical and electrical system (except as otherwise specified), for each piece of equipment, and for other systems and components specified in the technical Sections of the specification. Organize manuals into suitable volumes of manageable size, as approved by the Contacting Officer. Manuals shall have table of contents (TOC), and be assembled to conform to the TOC with tab sheets covering each subject. The instructions shall be legible and easy to read. Manuals shall be hard bound and sheets consistent in size; where oversize drawings are necessary they shall be folded. The organized document shall be labeled “Operation and Maintenance Manual” with the project name, building location, contact and project numbers appearing on the cover.

B. Contents: Manuals shall include, but not be limited to, the following data:

1. Detailed description of each system and each of its components, including layout showing piping, valves, and controls and other components, and including diagrams and illustrations where applicable.
2. Wiring and control diagrams with data to explain detailed operation and control of each component. Provide installed electrical panel schedules using the VA format.
3. Control sequence describing start-up, operation, and shut-down.
4. Procedure for starting.
5. Procedure for operating.
6. Shut-down instructions.
7. Installation instructions.
8. Maintenance and overhaul instructions.
9. Emergency instructions and safety precautions.
10. Corrected shop drawings.
11. Approved equipment data sheet using the VA format.
12. Approved certifications and laboratory test reports (where applicable).
13. Copies of warranties.
14. Test procedures.
15. Parts list, including source of supply, recommended spare parts, and service organization convenient to building site.

16. Name, address, and telephone number of each subcontractor who installed equipment and systems, and local representative for each type of equipment and each system.
17. Other pertinent data applicable to the operation and maintenance of particular systems or equipment and/or other data specified in technical Sections of the specification.

**1.6 APPROVED SUBMITTALS**

Provide Contracting Officer with one copy of each final approved submittal package with all review notations and remarks indicated prior to the time that system or equipment tests are performed, and two additional copies two (2) weeks before either the start of operation by the Government or any instruction period specified (whichever comes first).

**PART 2 – PRODUCTS**

**2.1 GENERAL**

A. Keys and Special Tools: Provide Resident Engineer with all keys and special tools that might be necessary for access, maintenance, and operation of installed items.

**PART 3 – EXECUTION**

**3.1 INSTRUCTIONS TO GOVERNMENT PERSONNEL**

A. Each applicable trade shall provide qualified, factory-trained representatives to give detailed instructions to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each system and piece of equipment. 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 of information.

B. Instructional services of competent instructors shall be provided for a minimum of 4 hours of onsite training to designated Government

employees covering the overall installation, operational methods, adjustments, care and periodic maintenance requirements for their systems.

C. Each instructor shall be familiar with all parts of their respective system and shall be trained in operating theory as well as practical operation and maintenance practices. Factory trained instructors shall be employed wherever practical and available. 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.

D. Utilize the maintenance manual for the system or equipment as a text for instruction. **Instruction shall include a full and extensive review of the maintenance and operation manual.** Failure to execute this task shall require additional training sessions when this information is made available.

E. Unless otherwise required or approved, the instruction shall be given during the regular work week after the equipment has been accepted and turned over to the Government for regular operation. Where significant changes or modifications in equipment are made under the terms of the guarantee, additional instruction shall be provided as may be necessary to acquaint the operating personnel of the changes or modifications. When more than four man-days (32 hours) of instruction are specified in other Sections, approximately half of the time shall be classroom instruction and the other half at the site of the system or equipment.

F. Upon completion, submit written acknowledgment with documentation to the Project Engineer demonstrating that the required instructions were successfully completed for each discipline.

**3.2 FINAL CLEANING**

A. Cleaning shall include dusting, washing, HEPA vacuuming and other required sanitizing of all surfaces within immediate and adjacent affected areas. All affected areas shall be cleaned, polished and hygienically sanitized including but not limited to floors, walls, partitions, ceilings (including above removable ceiling systems ceiling tiles), fixtures, lenses, windows, equipment, furniture (built-in or free standing), shelves counters, cabinets, doors, drawers. Comply with manufacturer’s instructions for cleaning operation. Close off

access to areas as cleaning is completed. **Project phasing shall require cleaning to be performed in various phases.**

B. The following minimum requirements shall be performed in addition to special cleaning requirements specified in other Sections:
   1. Remove markings that are not required as permanent labels.
   2. Vacuum clean carpeted surfaces and similar soft surfaces.
   3. Clean transparent materials, including mirrors and glass, to a polished clear condition. Replace broken glass and damaged transparent materials.
   4. Clean exposed exterior and interior hard-surface finishes, to a dirt-free condition, free of dust, stains, films and similar noticeable substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
   5. Remove debris and surface dust from limited-access spaces including roofs, plenums, chases, shafts, trenches, and similar spaces.
   6. Wet mop concrete floors in non-occupied spaces.
   7. Strip, wash, wax and polish to a sanitary clean condition all floor surfaces within the construction boundary and outside the boundary throughout areas of construction traffic flow throughout the project.
   8. Clean HVAC systems within the construction area to the requirements specified.
   9. HEPA vacuum the inside/outside sections of the building baseboard perimeter heating fin tube components within the construction area to insure clean and healthy operation.
   10. Wet wipe surfaces of equipment clean. Remove excess lubrication and other substances.
   11. Clean and polish plumbing fixtures to a sanitary condition free of stains.
   12. Clean light fixtures and lamps of debris and stains to function with full efficiency.
   13. Clean other items to a condition of sanitation and cleanliness acceptable for intended service use.

C. Damaged surfaces and items within the contract limits shall be patched, repaired, refinished, painted and/or replaced as necessary with materials comparable to the surrounding material and surface equal to

new conditions unless otherwise noted or directed by the VA Project Engineer. Finished surfaces shall be indistinguishable from the surrounding area.

D. Work Protection Removal: Except as otherwise indicated or requested by the Contacting Officer, remove temporary protection devices and facilities which were installed during course of the work to protect previously completed work during remainder of construction period.

**3.3 PARTIAL CHECKLIST PRIOR TO BENEFICIAL OCCUPANCY**

The Contractor is required to ensure that all the following list items are completed:

1. Mechanical Systems –
   - Completion of Mechanical System Inspecting and Testing Checklist as specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
   - Verification of Air Conveyance System Cleanliness as specified in Section 23 31 00, HVAC DUCTS AND CASINGS.
   - Equipment is operating correctly, air/water/steam flow balanced and thermostatic sensors control temperature as designed.
   - All parameters met per specifications (actual measurements) with documentation.
   - Equipment labeled, access doors tagged with belt and filter sizes designated.
   - Balancing Report for all HVAC piping and duct systems.
   - Mechanical/Plumbing System Valve Schedule sheets.
   - As-built plans with pipe/ductwork diagrams.
   - Equipment Data Records – Removed and/or Installed.
2. Electrical Systems –
   - Completion of Electrical System Inspecting & Testing Checklist as specified in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
   - Completion of NEC Compliance Checklist as specified in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
   - All parameters met per specifications (actual measurements) with documentation.
   - All panelboard labeled, circuits traced out, directories updated and panelboard schedule sheets completed (in typed format).

- Each receptacle and switch identified as to circuit and panelboard number.
- Master electrical one-liner updated.
- Record plans with wiring diagrams.
- Equipment Data Sheets.

3. Hospital Communication Systems –
   - Computer networks, special system alarms to digitizers, fire alarms.
   - HVAC energy management system.
4. Warranty –

   Contractor shall provide name and telephone number of qualified service organization to perform emergency repairs on a 24-hour basis. Each trade shall provide a minimum one (1) year (24 hour on call) labor/parts service for equipment troubleshooting and correction. Since warranties' starting dates may not be the same for all systems the starting dates must be explicitly stated with supporting documentation.

**3.4 CONTRACT COMPLETION**

A. Notification: Contractor shall notify the Contracting Officer in writing with supporting documentation, when all work has been completed in accordance with the contract requirements.

B. Acceptance: Final Inspection shall not be performed until Contractor issued final Punch List work is completed or otherwise resolved for acceptance with supporting documentation. All test and documentation for electrical and mechanical systems must be complete per contract requirements. Additional final Punch Lists may be developed in collaboration with Project A/E including Resident Engineer, Contacting Officer, Department Service (customer) and appropriate technical personnel from the Department of Veterans Affairs.

C. Keys issued to the Contractor by the VA shall be returned to the VA Resident Engineer at the completion of beneficial occupancy. Project completion is not achieved until all assigned VA keys have been returned.

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ATTACHMENT FOLLOWS

ATTACHMENT A: Equipment Data Record … 1 Page

# Equipment Data Record

**Contractor Removed and/or Installed Equipment**

VA Project Name & Number:

General Contractor Name & Address:

Subcontractor Name & Address:

Manufacturer:

Vendor:

Project Device Name:

Mfg's Device Name:

Model #:

Serial #:

VA #:

Bar Code #:

Acquisition Date:

Acquisition Value:

Life Expectancy:

Warranty Expiration Date:

Equipment Location:

Facility Utilities Altered:

Filter Size/Type/Qty:

Belt Size/Type/Qty:

M & O Comments:

# SECTION 02 41 00
# DEMOLITION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies demolition and removal of designated elements in buildings, utilities, other structures and waste and debris items in the project area. Construction and demolition waste includes products of demolition, excess or unusable construction materials, and packaging materials used for construction products.

B. **The Department of Veterans Affairs assumes no responsibility for the actual condition of items or structures to be demolished.**

C. During the execution of work, deactivation, relocation, rerouting, removal of existing equipment and systems shall be performed by the Contractor as required by the job conditions to facilitate the installation of the new work and systems.

### 1.2 RELATED WORK

Provide and coordinate all necessary work and products meeting the requirements associated with all applicable drawings and specification sections to produce a system complete, functional and ready for the purpose intended. No statements herein shall relieve the Contractor of responsibilities described elsewhere in the contract documents

A. Safety Requirements: GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.

C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.

D. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

E. Construction Waste Management: Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.

F. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article, INFECTION PREVENTION MEASURES.

### 1.3 SUBMITTALS

In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:

A. Manufacturer’s Literature and Data:

1. HEPA Air Scrubbers – Make, Model, Output.

2. HEPA Vacuums – Make, Model, Capacity.
3. Other dust control apparatus.

B. Submit a plan detailing project specific dust control and noise control measures, weather protection and safety precautions including weekly status reports.
1. Submit required Interim Life Safety Measures (ILSM) evaluation, and issue recurring reports according to the specified schedule.
2. Submit required Infection Control Risk Assessments (ICRA) plan, and issue recurring reports according to the specified schedule.
3. Submit documentation demonstrating the required number of HEPA Air Scrubbers necessary to achieve the required amount of negative air pressure and air changes within the work area during **all phases of work**, location of each HEPA Air Scrubbers and location of back up HEPA Air Scrubber.

C. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to the Resident Engineer for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required.
1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of construction and Medical Center operations.
2. Coordinate demolition and removal work with the Medical Center's continuing occupation of portions of the building.
3. Provide detailed disposal and retention methods to be utilized.

D. Submit required proof that an OSHA certified "Competent Person" (CP) (29 CFR 1926.20(b) (2)) shall maintain a presence at the work site whenever the general or subcontractors are present.
1. Submit a project Safety Plan in accordance with OSHA 29 CFR 1926 Safety and Health Regulations for Construction signed by the "Competent Person" (CP).
2. Submit OSHA certified Construction Safety course and other relevant competency training records of all employees for approval before the start of work.

**1.4 PROTECTION**

A. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. Contractor shall take necessary precautions to

avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Resident Engineer. Contractor shall coordinate this work with all other work as required.

B. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

C. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.

D. Construction and demolition shall be performed safely as directed by the VA Safety Officer, and, as a minimum, shall comply with the requirements of the latest editions of Safeguarding Building Construction and Demolition Operations (NFPA 241), Department of Labor General Industry Standards (DOL/OSHA - 29 CFR 1910) and Construction Industry Standards (DOL/OSHA - 29 CFR 1926).

E. Ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed. Do not overload structural elements, construct and maintain shoring, bracing, and supports as required. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Resident Engineer’s approval. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain. Protect all existing inside/outside finishes and partitions in areas adjacent to the construction area. Protect all components within the construction area either designated or required to remain or being salvaged.

F. The VA will be continuously occupying areas of the building immediately adjacent to demolition areas. Conduct demolition work in manner that will minimize need for disruption of the Medical Center's normal operations. Provide a minimum of 72 hours advance notice to the Project Engineer of demolition activities that will severely impact the Medical Center's normal operations. Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, utilities, and persons.

G. Provide temporary dustproof barrier partitions in existing structures where directed by the Resident Engineer. “ZipWall” (1-800-718-2255) and/or “SmartSeal” (1-407-466-9189) or equal dustproof barriers are required in occupied areas.

H. Provide temporary fire rated security sound/dust proof access barrier as required to restrict the flow of unauthorized personnel. Barrier shall be secured from floor to deck above ceiling. All barriers separating facility areas from construction areas shall be rated with self-closing, self-latching doors.

I. Sweep, vacuum and dust the work area daily. Prevent spread of flying particles and dust. Rubbish/debris covering, sprinkling (water and/or sweeping compound) or other approved methods shall be employed to improve particulate control in the work area as necessary. Provide covered carts to carry rubbish/debris through the building. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution.

J. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
   1. Provide protective measures (e.g., barricades) as required to provide free and safe passage of Medical Center personnel and general public to/from occupied areas.
   2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
   3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.

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

**PART 3 – EXECUTION**

**3.1 DEMOLITION**

A. Debris, including concrete, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Resident Engineer. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

B. Remove and legally dispose of all materials from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, shall be included as part of the lump sum compensation for the work of this section.

C. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Resident Engineer. When Utility lines are encountered that are not indicated on the drawings, the Resident Engineer shall be notified prior to further work in that area.

**3.2 CLEAN-UP**

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

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# SECTION 03 30 00
# CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies cast-in-place structural concrete and materials and mixes for other concrete, and anchor system repair of existing concrete.

### 1.2 RELATED WORK

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

### 1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN

A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by Resident Engineer. For all other testing, refer to Section 01 45 29, TESTING LABORATORY SERVICES.

B. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

### 1.4 TOLERANCES

A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).

B. Reinforcement Fabricating and Placing: ACI 117.

C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and - 6 mm (-1/4 inch).

D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155, except as follows:

1. Test entire slab surface, including those areas within 600 mm (2 feet) of construction joints and vertical elements that project through slab surface.
2. Maximum elevation change which may occur within 600 mm (2 feet) of any column or wall element is 6 mm (0.25 inches).
3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 1500 mm (5 feet).

### 1.5 REGULATORY REQUIREMENTS

A. ACI SP-66 – ACI Detailing Manual.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ACI 301 – Standard Specifications for Structural Concrete.

### 1.6 SUBMITTALS

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

B. Shop Drawings: Reinforcing steel: Complete shop drawings
C. Mill Test Reports:
   1. Reinforcing Steel.
   2. Cement.
D. Manufacturer's Certificates:
   1. Air-entraining admixture.
   2. Chemical admixtures, including chloride ion content.
   3. Liquid membrane-forming compounds for curing concrete.
   4. Non-shrinking grout.
E. Test Report for Concrete Mix Designs: Trial mixes including water-cement-fly ash ratio curves, concrete mix ingredients, and admixtures.
F. Follow Article 2.3 herein for submittals for post-installed adhesive anchors.
G. Follow Article 2.4 herein for submittals for expansion anchors.

**1.7 DELIVERY, STORAGE, AND HANDLING**

A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.
B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement and fly ash in separate suitable bins.
C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

**1.8 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 Concrete Institute (ACI):

117-10.....Specifications for Tolerances for Concrete Construction and Materials and Commentary
211.1-91(R2009).....Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
214R-11.....Guide to Evaluation of Strength Test Results of Concrete
301-10.....Standard Practice for Structural Concrete
304R-00(R2009).....Guide for Measuring, Mixing, Transporting, and Placing Concrete

305.1-06.....Specification for Hot Weather Concreting
306.1-90(R2002).....Standard Specification for Cold Weather Concreting
308.1-11.....Specification for Curing Concrete
309R-05.....Guide for Consolidation of Concrete
318-11.....Building Code Requirements for Structural Concrete and Commentary
347-04.....Guide to Formwork for Concrete
SP-66-04.....ACI Detailing Manual

C. American Society for Testing and Materials (ASTM):
A82/A82M-07.....Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
A153/A153M-09.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A185/185M-07.....Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
A193/A193M-12b.....Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
A194/A194M-13.....Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
A563-07a.....Carbon and Alloy Steel Nuts
A615/A615M-09.....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the field
C33/C33M-11A.....Standard Specification for Concrete Aggregates
C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C94/C94M-12.....Standard Specification for Ready Mixed Concrete
C143/C143M-10.....Standard Test Method for Slump of Hydraulic Cement Concrete
C150-11.....Standard Specification for Portland Cement
C171-07.....Standard Specification for Sheet Materials for Curing Concrete
C172-10.....Standard Practice for Sampling Freshly Mixed Concrete
C173-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C192/C192M-07.....Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

C231-10.....Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260-10.....Standard Specification for Air Entraining Admixtures for Concrete

C309-11.....Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

C494/C494M-11.....Standard Specification for Chemical Admixtures for Concrete

C618-12.....Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C1107/1107M-11.....Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

C1315-11.....Standard Specification for Liquid Membrane Forming Compounds Having Special Properties for Curing and Sealing Concrete

D4263-83(2012).....Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

D4397-10.....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

E1155-96(R2008).....Standard Test Method for Determining $F_F$ Floor Flatness and $F_L$ Floor Levelness Numbers

F844-07a.....Washers, Steel, Plain (Flat), Unhardened for General Use

F1869-11.....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

D. American Welding Society (AWS):

D1.4/D1.4M-11.....Structural Welding Code - Reinforcing Steel

E. Concrete Reinforcing Steel Institute (CRSI):

Handbook 2008

F. National Cooperative Highway Research Program (NCHRP):

Report On.....Concrete Sealers for the Protection of Bridge Structures

G. U. S. Department of Commerce Product Standard (PS):

PS 1.....Construction and Industrial Plywood

PS 20.....American Softwood Lumber

H. U. S. Army Corps of Engineers Handbook for Concrete and Cement:
CRD C513.....Rubber Waterstops
CRD C572.....Polyvinyl Chloride Waterstops

**PART 2 – PRODUCTS**

**2.1 FORMS**

A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.

B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.

C. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

**2.2 MATERIALS**

A. Portland Cement: ASTM C150 Type I or II.

B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.

C. Coarse Aggregate: ASTM C33.

1. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.

D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150 µm (No. 100) sieve.

E. Mixing Water: Fresh, clean, and potable.

F. Admixtures:

1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.

3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.
4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one (1) year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
5. Air Entraining Admixture: ASTM C260.
6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
7. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.

G. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.

H. Welded Wire Fabric: ASTM A185.

I. Cold Drawn Steel Wire: ASTM A82.

J. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.

K. Sheet Materials for Curing Concrete: ASTM C171.

L. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315.Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.

M. Moisture Vapor Emissions and Alkalinity Control Sealer (MVE): 100% active colorless aqueous siliconate solution concrete surface.
1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
2. MVE 15-Year Warranty:
   a. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Moisture Vapor Emissions and Alkalinity Control Sealer according to manufacturer’s instruction, sealer manufacturer shall warrant the floor covering system against failure due to moisture vapor migration or

moisture-born contaminates for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminates.

N. Non-Shrink Grout:
   1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
   2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.

O. Fibers:
   1. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Use appropriate length and 0.9 kg/m$^3$ (1.5 lb. per cubic yard). Product shall have a UL rating.
   2. Steel Fibers: ASTM A820, Type I cold drawn, high tensile steel wire for use as primary reinforcing in slab-on-grade. Minimum dosage rate 18 kg/m$^3$ (30 lb. per cubic yard).

P. Bonding Admixture: Non-rewettable, polymer modified, bonding compound.

Q. Patching Compound and Joint Filler: Per MVE manufacturer and finished flooring manufacturer requirements; coordinate with respective manufacturers.

R. Crushed Stone Subbase: N.Y.S.D.O.T. MD 703-201, Type 4 subbase.

**2.3 EPOXY ANCHORING SYSTEM**

A. Epoxy Adhesive Anchoring System for Post-Installed Reinforcement and Anchors: Provide injectable epoxy adhesive anchoring system for embedding rebar and continuously threaded rods into cracked and uncracked concrete, as well as grouted masonry construction.
   1. Adhesives shall be furnished, stored, and installed per manufacturer's instructions. Only injection tools and static mixing nozzles as supplied by the manufacturer shall be used.
   2. Contractor shall prepare and submit a procedure for the installation process implementing the manufacturer's instructions for both typical and overhead installations. After the procedure has been approved by the contracting officer, an initial installation per the procedure submitted shall be carried out with the manufacturer's engineer and

special inspector present to review and verify the installation process

3. Reinforcing bars and threaded rods installed in an overhead application shall make use of piston plugs during installation, and bar/rod supports during and after installation until adhesive is fully cured, as required by the manufacturer.
4. Contractor shall submit ICC-ES Evaluation Report showing full compliance for use with ICC IBC. Report shall include installation instructions, load tables and data, design information, and relevant material properties.
5. Adhesive anchoring system must be specifically permitted to be installed in concrete that is cracked or that may be expected to crack during the service life of the anchor/rebar.
6. Adhesive shall meet a minimum bond strength of 0.0068 MPA (1,045 psi) in uncracked concrete for a maximum long term temperature of 50 degrees C (122 degrees F) and a maximum short term temperature of 80 degrees C (176 degrees F).
7. Adhesive anchors consist of threaded steel rods meeting the following requirements:
   a. ASTM A193 Grade B7 with minimum ultimate strength of 0.86 MPa (125,000 psi), and minimum specified yield strength of 0.72 MPa (105,000 psi).
   b. Nuts per ASTM A194.
   c. Nuts and rods galvanized per ASTM A193 Class C or D.
   d. Threaded rods must be straight and free of indentations or other defects along their length.

**2.4 EXPANSION ANCHORS**

A. Torque controlled expansion anchors used to connect to existing concrete or grouted masonry.
   1. Submit ICC-ES Evaluation Report showing full compliance with ICC IBC. Report to include installation instructions, load tables and data, design information, and relevant material properties.
   2. Anchors must be rated for use in cracked and uncracked concrete located in seismic design Categories A through F per ICC IBC.
   3. Mechanical expansion must allow for immediate load application.
   4. Must meet the ductility requirements of ACI 318 Section D1.
   5. Expansion anchors shall be heavy duty anchors constructed from carbon steel, unless otherwise noted. Diameter is as specified on the drawings.

6. Where indicated, expansion anchors shall be hot-dipped galvanized in accordance with ASTM A153 Class C.
7. Nuts used in expansion anchor assemblies shall conform to the requirements of ASTM A563, Grade A, Hex.
8. Washers used in expansion anchor assemblies shall conform to the requirements of ASTM F844.
9. 12 mm (1/2 inch) diameter anchor must have the following minimum strengths:
   a. Minimum steel strength in shear Vsa = 5,495 lbs.
   b. Minimum steel strength in tension Nsa = 10,700 lbs.
10. 19 mm (3/4 inch) diameter anchor must have the following minimum strengths:
   a. Minimum steel strength in shear Vsa = 13,675 lbs.
   b. Minimum steel strength in tension Nsa = 25,100 lbs.
   c. Minimum steel strength in shear, seismic Vs,seis = 11,745 lbs.

**2.5 CONCRETE MIXES**

A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.
   1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
   2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per $m^3$ (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement -fly ash ratio, and consistency of each cylinder in terms of slump.
   3. Prepare a curve showing relationship between water-cement-fly ash ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
   4. If the field experience method is used, submit complete standard deviation analysis.

B. Fly Ash Testing: Submit certificate verifying conformance with ASTM 618 initially with mix design and for each truck load of fly ash delivered from source. Submit test results performed within 6 months of submittal date. Notify Resident Engineer immediately when change in source is anticipated.
   1. Testing Laboratory used for fly ash certification/testing shall participate in the Cement and Concrete Reference Laboratory (CCRL) program. Submit most recent CCRL inspection report.

C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of Resident Engineer or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. Resident Engineer may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and fly ash and approval of design mix.

D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work.

**TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE**

| Concrete Strength | | Non-Air-Entrained | Air-Entrained | |
|---|---|---|---|---|
| Min. 28 Day Comp. Str. MPa (psi) | Min. Cement kg/m$^3$ (lbs/c. yd) | Max. Water Cement Ratio | Min. Cement kg/m$^3$ (lbs/c. yd) | Max. Water Cement Ratio |
| 30 (4000) | 325 (550) | 0.55 | 340 (570) | 0.50 |

E. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

**TABLE II - MAXIMUM SLUMP, MM (INCHES)***

| Type of Construction | Normal Weight Concrete |
|---|---|
| Slabs, Pads, and Curbs | 100 mm (4 inches) |

F. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 225 mm (9 inches). The concrete shall arrive at the job site at a slump of 50 mm to 75 mm (2 inches to 3 inches). This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.

G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Determine air content by either ASTM C173 or ASTM C231.

**TABLE III - TOTAL AIR CONTENT**
**FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

| Nominal Maximum Size of Total Air Content | Coarse Aggregate, mm (Inches) Percentage by Volume |
|---|---|
| 10 mm (3/8 in).6 to 10 | 13 mm (1/2 in).5 to 9 |
| 20 mm (3/4 in).4 to 8 | |

H. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete use high-range water-reducing admixture (superplasticizer).

I. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III.

J. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, Resident Engineer may require any one or any combination of the following corrective actions, at no additional cost to the Government:

1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
2. Require additional curing and protection.
3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, Resident Engineer may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, Resident Engineer may order load tests, made by Contractor retained testing agency, on portions of

building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.

5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the Resident Engineer.

**2.6 BATCHING AND MIXING**

A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by Resident Engineer. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 38$^0$C (100 degrees Fahrenheit). Minimum delivery temperature as follows:

| Atmospheric Temperature | Minimum Concrete Temperature |
|---|---|
| -1. degrees to 4.4 degrees C (30 degrees to 40 degrees F) | 15.6 degrees C (60 degrees F.) |
| -17 degrees C to -1.1 degrees C (0 degrees to 30 degrees F.) | 21 degrees C (70 degrees F.) |

**PART 3 – EXECUTION**

**3.1 FORMWORK**

A. General: Design in accordance with ACI 347 is the responsibility of the Contractor.

1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and Resident Engineer approves their reuse.

B. Treating and Wetting: Treat or wet contact forms as follows:

1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
3. Use sealer on reused plywood forms as specified for new material.

C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.

D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.

E. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

F. Inserts, Sleeves, and Similar Items: Flashing reglets, steel strips, masonry ties, anchors, wood blocks, nailing strips, grounds, inserts, wire hangers, sleeves, drains, guard angles, forms for floor hinge boxes, inserts or bond blocks for elevator guide rails and supports, and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned, and built into construction, and maintained securely in place.

1. Locate inserts or hanger wires for furred and suspended ceilings only in bottom of concrete joists, or similar concrete member of overhead concrete joist construction.
2. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
3. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
4. Provide recesses and blockouts in floor slabs for door closers and other hardware as necessary in accordance with manufacturer's instructions.

G. Construction Tolerances:
   1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
   2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

**3.2 PLACING REINFORCEMENT**

A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.
B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.
   1. Place reinforcing bars accurately and tie securely at intersections and splices with 1.6 mm (16 gauge) black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
   2. Lap welded wire fabric at least 1-1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs.
C. Spacing: Minimum clear distances between parallel bars shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.
D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
   1. Lap splices: Minimum lengths of lap as shown.
   2. Mechanical Splices: Develop in tension and compression at least 125 percent of the yield strength (fy) of the bars. Stresses of transition splices between two reinforcing bar sizes based on area of smaller bar. Provide mechanical splices at locations indicated. Use approved exothermic, tapered threaded coupling, or swaged and

threaded sleeve. Exposed threads and swaging in the field not permitted.

a. Initial qualification: In the presence of Resident Engineer, make three test mechanical splices of each bar size proposed to be spliced. Department of Veterans Affairs retained testing laboratory will perform load test.

b. During installation: Furnish, at no additional cost to the Government, one companion (sister) splice for every 50 splices for load testing. Department of Veterans Affairs retained testing laboratory will perform the load test.

E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by Resident Engineer.

F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.

G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

**3.3 SLABS RECEIVING RESILIENT COVERING**

A. Contractor shall utilize the Moisture Vapor Emissions and Alkalinity Control Sealer as follows:

1. Sealer is applied on the day of the concrete pour, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.

2. Manufacturer’s representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.

a. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.

b. Spray apply Sealer at the rate of 20 $m^2$ (200 square feet) per gallon. Lightly broom product evenly over the substrate and product has completely penetrated the surface.

**3.4 CONSTRUCTION JOINTS**

A. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at

center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.

**3.5 EXPANSION JOINTS AND CONTRACTION JOINTS**

A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

B. Provide contraction (control) joints in floor slabs at maximum spacing of 3.6 m (12 feet) on center with 1.5:1 aspect ratio. Joints shall be either formed or saw cut, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

**3.6 PLACING CONCRETE**

A. Preparation:

1. Remove hardened concrete, wood chips, shavings and other debris from forms.
2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
3. Have forms and reinforcement inspected and approved by Resident Engineer before depositing concrete.
4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement.

B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.

1. Preparing surface for applied topping:
   a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
   b. Broom clean and keep base slab wet for at least four hours before topping is applied.
   c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of Resident Engineer.

D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
   1. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
   2. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) WEATHER.
   3. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1-1/2 or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
   4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
   5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
   6. On bottom of members with severe congestion of reinforcement, deposit 25 mm (1 inch) layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.

E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.
   1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.

2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

**3.7 HOT WEATHER**

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

**3.8 COLD WEATHER**

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyantes or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by Resident Engineer.

**3.9 PROTECTION AND CURING**

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by Resident Engineer.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer’s instructions. Apply immediately after finishing. Maximum coverage $10m^2/L$ (400 square feet per gallon) on steel troweled surfaces and $7.5m^2/L$ (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.
3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

**3.10 REMOVAL OF FORMS**

A. Remove in a manner to assure complete safety of structure after the following conditions have been met.

**3.11 CONCRETE SURFACE PREPARATION**

A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.

B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.

C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

**3.12 CONCRETE FINISHES**

A. Slab Finishes:

1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Provide

information to Resident Engineer and floor consultant for evaluation and recommendations for subsequent placements.

2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless Resident Engineer determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.
7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two (2) hours after placing to roughen slab surface to ensure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps,

stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.

9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings, and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.
10. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:
    a. Areas covered with carpeting, or not specified otherwise in b. below:
        1) Level suspended slabs (shored until after testing) and topping slabs:
            a) Specified overall value FF 25/FL 20
            b) Minimum local value FF 17/FL 15
        2) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
    b. Areas that will be exposed, receive thin-set tile or resilient flooring, or roof areas designed as future floors:
        1) Level suspended slabs (shored until after testing) and topping slabs
            a) Specified overall value FF 30/FL 20
            b) Minimum local value FF 24/FL 15
        2) Level tolerance such that 80 percent of all points fall within a 20 mm (3/4 inch) envelope +10 mm, -10 mm (+3/8 inch, -3/8 inch) from the design elevation.
    c. "Specified overall value" is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.

d. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.

11. Measurements:
    a. Department of Veterans Affairs retained testing laboratory will take measurements as directed by Resident Engineer, to verify compliance with FF, FL, and other finish requirements. Measurements will occur within 72 hours after completion of concrete placement (weekends and holidays excluded). Make measurements before shores or forms are removed to insure the "as-built" levelness is accurately assessed. Profile data for above characteristics may be collected using a laser level or any Type II apparatus (ASTM E1155, "profileograph" or "dipstick"). Contractor's surveyor shall establish reference elevations to be used by Department of Veterans Affairs retained testing laboratory.
    b. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses, finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.
12. Acceptance/Rejection:
    a. If individual slab section measures less than either of specified minimum local $F_F/F_L$ numbers, that section shall be rejected and remedial measures shall be required. Sectional boundaries may be set at construction and contraction (control) joints, and not smaller than one-half bay.
    b. If composite value of entire slab installation, combination of all local results, measures less than either of specified overall $F_F/F_L$ numbers, then whole slab shall be rejected and remedial measures shall be required.
13. Remedial Measures for Rejected Slabs: Correct rejected slab areas by grinding, planing, surface repair with underlayment compound or repair topping, retopping, or removal and replacement of entire

rejected slab areas, as directed by Resident Engineer, until a slab finish constructed within specified tolerances is accepted.

**3.13 SURFACE TREATMENTS FOR EXPOSED CONCRETE FLOORS**

A. Liquid Densifier/Sealer: Apply in accordance with manufacturer's directions just prior to completion of construction.

B. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Broadcast aggregate uniformly over concrete surface at rate of application of 8% per 1/10th $m^2$ (7.5 percent per square foot) of area. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water to slightly expose abrasive aggregate.

**3.14 APPLIED TOPPING**

A. Separate concrete topping on floor base slab of thickness and strength shown. Topping mix shall have a maximum slump of 200 mm (8 inches) for concrete containing a high-range water-reducing admixture (superplasticizer) and 100 mm (4 inches) for conventional mix. Neatly bevel or slope at door openings and at slabs adjoining spaces not receiving an applied finish.

B. Placing: Place continuously until entire section is complete, struck off with straightedge, leveled with a highway straightedge or highway bull float, floated and troweled by machine to a hard dense finish. Slope to floor drains as required. Do not start floating until free water has disappeared and no water sheen is visible. Allow drying of surface moisture naturally. Do not hasten by "dusting" with cement or sand.

**3.15 RESURFACING FLOORS**

Remove existing flooring areas to receive resurfacing to expose existing structural slab and extend not less than 25 mm (1 inch) below new finished floor level. Prepare exposed structural slab surface by roughening, broom cleaning, and dampening. Apply specified bonding grout. Place topping while the bonding grout is still tacky.

**3.16 EPOXY ADHESIVE ANCHORING AND EXPANSION ANCHORING SYSTEMS**

A. Follow manufacturer’s written instructions and recommendations for handling and installation.

- - - E N D - - -

# SECTION 03 54 16
# CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies liquid applied, cementitious self-leveling floor underlayment.

### 1.2 RELATED WORK

A. Concrete floor substrate: Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. Drains and cleanouts: Division 22 Sections.

### 1.3 QUALITY CONTROL AND QUALIFICATIONS

A. Safety Precautions: Take all necessary precautions against damaging adjacent surfaces and other hazards during delivery, storage, and installation of materials specified.

B. Manufacturer: Company specializing in manufacture of products specified with a minimum of five (5) years documented experience.

C. Applicator/Installer: Company specializing in performing work of this section with minimum five (5) years documented experience and approved by manufacturer.

1. Installer performing the work of this Section shall submit a statement from the underlayment system manufacturer stating that the subcontractor and his forces are acceptable to the manufacturer and that he is using manufacturer-approved mixing and pumping equipment.

D. Inspection: Upon completion of the installation, a representative of the cementitious underlayment materials' manufacturer shall inspect the Work to confirm that the system has been installed according to the manufacturer's written specifications, details and instructions.

E. At least thirty (30) days prior to the start of work under this Section, submit for approval to the COTR a copy of the material manufacturer's system specifications to be followed and a list of the brand identification for all materials to be used.

F. There shall be no deviation made from this Specification without prior written approval by the manufacturer and the COTR.

G. Source Quality Control: Obtain primary materials of each type required from single manufacturer supplying principal materials for cementitious underlayments. Provide secondary materials only as recommended and approved by manufacturer of primary materials.

**1.4 SUBMITTALS**

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

B. Manufacturer's Literature and Data:

1. Copies of manufacturer’s current published literature, data sheets, installation recommendations, and maintenance instructions for materials specified shall be submitted for approval, and approval obtained before materials are delivered to the Project site.
2. Include underlayment manufacturer’s instruction sheets, diagrams and shop drawings showing requirements for forming and preparation of concrete substrate, joints in substrate, flashings, treatment of cracks in substrate, sealing of penetrations through system, and terminations. Prepare and submit graphic material at a scale not less than half full size.

C. Manufacturer's Informational Submittals and Certificates:

1. Written instructions for mix and application.
2. Written surface cleaning instructions.
3. Certificates:
   a. Certify products meet or exceed specified requirements.
   b. Certify each underlayment and flooring covering system is compatible.
   c. Certify applicator is approved by manufacturer.

D. Samples:

1. All products comprising the cementitious underlayment system, 304 mm (12 inch) square stepped composite, three samples total.
2. Manufacturer’s standard color line; cured physical samples.

**1.5 PREINSTALLATION MEETING**

A. Approximately two (2) weeks prior to scheduled commencement of cementitious underlayment installation, conduct conference at Project site with Installer, Contractor, Architect, COTR, and underlayment materials manufacturer’s representative in attendance.

B. Contractor shall record discussions of conference, together with decisions and agreements (or disagreements) reached. Furnish copy of record to each party attending.

**1.6 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Deliver materials in original unopened containers; labeled with manufacturer's name, brand name, installation instructions and identification of various items.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

**1.7 ENVIRONMENTAL REQUIREMENTS**

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Maintain ambient temperature and substrate temperature between 10 and 27 degrees C (50 and 80 degrees F) 24 hours before, during and 72 hours after installation of underlayment.

C. During the curing process ventilate spaces to remove excess moisture.

**1.8 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):

C109/C109M-13.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)

C150/C150M-12.....Standard Specification for Portland Cement

C219-13a.....Terminology Relating to Hydraulic Cement

C. Material shall have a UL 790 Class A approval for non-combustible surfaces.

**PART 2 - PRODUCTS**

**2.1 CEMENT-BASED UNDERLAYMENT**

A. Underlayment: Hydraulic cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thicknesses of 3 mm (1/8-inch) and can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M, Portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
2. Compressive Strength: Not less than 28 MPa (4100 psi) at 28 days when tested according to ASTM C109/C109M.

B. Aggregate: Well-graded, washed gravel, 3 to 6 mm (1/8 to 1/4 inch); or coarse sand as recommended by underlayment manufacturer.
C. Water: Potable and not detrimental to underlayment mix materials.
D. Primer: Product recommended in writing by underlayment manufacturer for substrate, conditions, and application indicated.
E. Joint and Crack Filler: Product(s) compatible with underlayment and as recommended by the underlayment materials manufacturer.
F. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
G. Corrosion-Resistant Coating: As recommended in writing by underlayment manufacturer for metal substrates.
H. Material shall be VOC compliant per applicable Federal, State and Local rules, regulations and authorities having jurisdiction, with the most stringent requirements governing.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Examine substrates and verify surfaces are clean, dry, unfrozen, do not contain petroleum by-products, or other contaminating compounds detrimental to underlayment material bond to substrate.
B. Notify A/E in writing if any conditions or surfaces exist which the Installer considers detrimental to the proper and expeditious installation of his work.
C. Starting Work of this section shall imply acceptance of the surfaces and conditions to perform the work as specified.

**3.2 PREPARATION**

A. General: Prepare and clean substrate according to manufacturer’s written instructions.
   1. Treat nonmoving substrate cracks according to manufacturer written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
   2. Fill substrate voids to prevent underlayment from leaking.
   3. Remove substrate surface irregularities, spalled areas; fill voids and deck joints with filler. Finish smooth.
   4. Vacuum clean surfaces.

5. Prime substrate as recommended by the manufacturer's representative for all conditions encountered at the Project site.
6. Close floor openings.

B. Concrete Substrates: In accordance with manufacturer's written instructions:
1. Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
2. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F1869. Proceed with installation only after substrates do not exceed a maximum moisture vapor emission rate of [3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m)] in 24 hours.

C. Metal Substrates: In accordance with manufacturer's written instructions:
1. Mechanically remove rust, foreign matter, and other contaminants that might impair underlayment bond.
2. If recommended, apply corrosion-resistant coating compatible with underlayment.

D. Nonporous Substrates: In accordance with manufacturer's written instructions:
1. For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond.

E. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment in accordance with manufacturer's written instructions.

**3.3 APPLICATION**

A. Refer to Drawings for locations to receive underlayment.
B. Install underlayment prior to the installation of partitions.
C. General: Mix and apply underlayment components according to manufacturer's written instructions.
1. Close areas to traffic during underlayment application and after application for time period recommended by manufacturer.
2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
3. At substrate expansion, isolation, and other moving joints allow joint of same width to continue through underlayment.

D. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

E. Apply underlayment to produce uniform, level, and smooth surface:

1. Place material as continuously as possible until application in each contiguous area is complete; do not place slurry against underlayment product that has obtained its initial set.
2. Terminate material at locations and as detailed/noted on Drawings.
3. Place to minimum 3 mm (1/8-inch) and maximum 6 mm (1/2-inch) thickness, unless otherwise indicated.
4. Feather edges for smooth transition.

F. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

G. Do not install floor coverings over underlayment until after time period recommended by underlayment manufacturer.

H. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a hollow sound when tapped.

**3.4 FIELD QUALITY CONTROL**

Field Samples: At least one (1) set of three (3) molded cube samples shall be taken from each day's pour during the underlayment installation. Cubes shall be tested as recommended by underlayment manufacturer in accordance with modified ASTM C109. Submit test results to the COTR.

**3.5 PROTECTION AND CLEANING**

A. Protect underlayment from concentrated and rolling loads for remainder of construction period with temporary wood planking.

B. Do not permit traffic over unprotected floor underlayment surfaces.

C. Clean staining or soiling of adjacent materials or surfaces immediately as the work progresses, including smears, droppings or displaced material and leave work in a neat, clean condition upon completion.

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# SECTION 04 05 13
# MASONRY MORTARING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies mortar materials and mixes.

### 1.2 RELATED WORK

A. Mortar used in Section:
   1. Section 04 05 16, MASONRY GROUTING.
   2. Section 04 20 00, UNIT MASONRY.
   3. Section 04 05 31, MASONRY TUCK POINTING.

### 1.3 TESTS

A. During progress of work, testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES, takes and tests samples as specified in that section. Testing procedures and test methods in ASTM C780.

### 1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Certificates:
   1. Indicating that following items meet specifications:
      a. Portland cement.
      b. Hydrated lime.
      c. Fine aggregate (sand).
      d. Color admixture.
      e. Potable water.
C. Laboratory Test Reports:
   1. Mortar, each type.
   2. Admixtures.
D. Manufacturer's Literature and Data:
   1. Portland cement.
   2. Hydrated lime.
   3. Admixtures.

### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.
B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

**1.6 APPLICABLE PUBLICATIONS**

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

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

C40-04.....Organic Impurities in Fine Aggregates for Concrete

C109-08.....Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-MM Cube Specimens)

C144-04.....Aggregate for Masonry Mortar

C150-09.....Portland Cement

C207-06.....Hydrated Lime for Masonry Purposes

C270-10.....Mortar for Unit Masonry

C307-03(R2008).....Tensile Strength of Chemical - Resistant Mortar, Grouts, and Monolithic Surfacing

C321-00(R2005).....Bond Strength of Chemical-Resistant Mortars

C780-10.....Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

C979-10.....Pigments for Integrally Colored Concrete

**PART 2 - PRODUCTS**

**2.1 HYDRATED LIME**

ASTM C207, Type S.

**2.2 AGGREGATE FOR MASONRY MORTAR**

A. ASTM C144 and as follows:

1. Light colored sand for mortar for laying face masonry units.
2. White plastering sand meeting sieve analysis for mortar joints for pointing.

B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

**2.3 PORTLAND CEMENT**

A. ASTM C150, Type I.

B. Use white Portland cement wherever white mortar is specified.

**2.4 WATER**

Potable, free of substances that are detrimental to mortar, masonry, and metal.

**2.5 MASONRY MORTAR**

A. Conform to ASTM C270.

B. Admixtures:
   1. Do not use mortar admixtures, except for color admixtures, unless approved by Resident Engineer.
   2. Submit laboratory test report showing effect of proposed admixture on water retention and water repellency of mortar.
   3. Do not use antifreeze compounds.
C. Colored Mortar:
   1. Maintain uniform mortar color for exposed work throughout.
   2. Match mortar color in approved sample or mock-up.
   3. Color of mortar for exposed work in alteration work to match color of existing mortar unless specified otherwise.
D. Color Admixtures:
   1. Proportion as specified by manufacturer.

**2.6 COLOR ADMIXTURE**

A. Pigments: ASTM C979.
B. Use mineral pigments only. Organic pigments are not acceptable.
C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

**PART 3 - EXECUTION**

**3.1 MIXING**

A. Mix in a mechanically operated mortar mixer.
   1. Mix mortar for at least three minutes but not more than five minutes.
B. Measure ingredients by volume. Measure by the use of a container of known capacity.
C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
D. Mortar that has stiffened because of loss of water through evaporations:
   1. Re-tempered by adding water to restore to proper consistency and workability.
   2. Discard mortar that has reached its initial set or has not been used within two hours.

**3.2 MORTAR USE LOCATION**

A. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered) and engineered reinforced unit masonry work.
B. Use Type N mortar for other masonry work, except as otherwise specified.
C. Use Type N mortar for tuck pointing work.

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# SECTION 04 05 16
# MASONRY GROUTING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies grout materials and mixes.

### 1.2 RELATED WORK

A. Grout used in Section:
   1. Section 04 20 00, UNIT MASONRY.

### 1.3 TESTS

A. Test grout and materials specified.
B. Certified test reports.
C. Identify materials by type, brand name and manufacturer or by origin.
D. Do not use materials until laboratory test reports are approved by Resident Engineer.
E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.
F. Testing:
   1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
   2. Grout:
      a. Test for compressive strength; ASTM C1019.
      b. Grout compressive strength of 13790 kPa (2000 psi) at 28 days.
   3. Sand: Test for deleterious substances, organic impurities, soundness and grading.

### 1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Certificates:
   1. Indicating that following items meet specifications:
      a. Portland cement.
      b. Grout.
      c. Hydrated lime.
      d. Fine aggregate (sand).
      e. Coarse aggregate for grout.
      f. Color admixture.
      g. Potable water.
C. Laboratory Test Reports:
   1. Grout, each type.

2. Color admixtures.

D. Manufacturer's Literature and Data:

1. Portland cement.
2. Hydrated lime.
3. Color admixtures.

**1.5 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.

B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

**1.6 APPLICABLE PUBLICATIONS**

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

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

C40-04.....Organic Impurities in Fine Aggregates for Concrete
C150-09.....Portland Cement
C207-06.....Hydrated Lime for Masonry Purposes
C404-07.....Aggregate for Masonry Grout
C476-10.....Grout for Masonry
C979-10.....Pigments for Integrally Colored Concrete
C1019-11.....Sampling and Testing Grout

**PART 2 - PRODUCTS**

**2.1 HYDRATED LIME**

ASTM C207, Type S.

**2.2 AGGREGATE FOR MASONRY GROUT**

ASTM C404, Size 8.

**2.3 PORTLAND CEMENT**

A. ASTM C150, Type 1.

B. Use white Portland cement wherever white or light colored mortar is specified or required to match existing colors.

**2.4 WATER**

Potable, free of substances that are detrimental to grout, masonry, and metal.

**2.5 GROUT**

A. Conform to ASTM C476 except as specified.

B. Grout type proportioned by volume as follows:

1. Fine Grout:
   a. Portland cement: one part.
   b. Hydrated lime: 0 to 1/10 part.
   c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
2. Coarse Grout:
   a. Portland cement: one part.
   b. Hydrated lime: 0 to 1/10 part.
   c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
   d. Coarse aggregate: one to two times sum of volumes of cement and lime used.
3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

C. Grout Color: Match existing, unless otherwise indicated.

**2.6 COLOR ADMIXTURE**

A. Pigments: ASTM C979.
B. Use mineral pigments only. Organic pigments are not acceptable.
C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

**PART 3 - EXECUTION**

**3.1 MIXING**

A. Mix in a mechanically operated grout mixer.
   1. Mix grout for at least five minutes.
B. Measure ingredients by volume. Measure by the use of a container of known capacity.
C. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.

**3.2 GROUT USE LOCATIONS**

A. Use fine grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is 50 mm (2 inches) or less.
B. Use either fine grout or coarse grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is greater than 50 mm (2 inches).
C. Do not use grout for filling bond beam or lintel units.

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# SECTION 04 05 31
# MASONRY TUCK POINTING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies requirements for tuck pointing of existing masonry.

### 1.2 RELATED WORK

Mortars: Section 04 05 13, MASONRY MORTARING.

### 1.3 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):
C270-07.....Mortar for Unit Masonry

C. International Masonry Institute: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

## PART 2 - PRODUCTS

### 2.1 TUCK POINTING MORTAR

A. As per appendix X3 of ASTM C270.

### 2.2 REPLACEMENT MASONRY UNITS

A. Units to match existing.

## PART 3 - EXECUTION

### 3.1 CUT OUT OF EXISTING MORTAR JOINTS

A. Cut out existing mortar joints (both bed and head joints) and remove by means of a toothing chisel or a special pointer's grinder, to a uniform depth of to 19 mm (3/4-inch), or until sound mortar is reached. Take care to not damage edges of existing masonry units to remain.

B. Remove dust and debris from the joints by brushing, blowing with air or rinsing with water. Do not rinse when temperature is below freezing.

### 3.2 JOB CONDITIONS

A. Cold Weather Protection:

1. Tuck pointing may be performed in freezing weather when methods of protection are utilized.
2. Comply with applicable sections of "Recommended Practices for Cold Weather Construction" as published by International Masonry Industry All Weather Council.

3. Existing surfaces at temperatures to prevent mortar from freezing or causing other damage to mortar.

**3.3 INSTALLATION OF TUCK POINTING MORTAR**

A. Immediately prior to application of mortar, dampen joints to be tuck pointed. Prior to application of pointing mortar, allow masonry units to absorb surface water.

B. Tightly pack mortar into joints in thin layers, approximately 6 mm (1/4-inch) thick maximum.

C. Allow layer to become "thumbprint hard" before applying next layer.

D. Pack final layer flush with surfaces of masonry units. When mortar becomes "thumbprint hard", tool joints.

**3.4 TOOLING OF JOINTS**

A. Tool joints with a jointing tool to produce a smooth, compacted, concaved joint.

B. Tool joints in patch work with a jointing tool to match the existing surrounding joints.

**3.5 REPLACEMENT OF MASONRY UNITS**

A. Cut out mortar joints surrounding masonry units that are to be removed and replaced.

1. Units removed may be broken and removed, providing surrounding units to remain are not damaged.
2. Once the units are removed, carefully chisel out the old mortar and remove dust and debris.

B. Dampen surfaces of the surrounding units before new units are placed.

1. Allow existing masonry to absorb surface moisture prior to starting installation of the new replacement units.
2. Butter contact surfaces of existing masonry and new replacement masonry units with mortar.
3. Center replacement masonry units in opening and press into position.
4. Remove excess mortar with a trowel.
5. Point around replacement masonry units to ensure full head and bed joints.
6. When mortar becomes "thumbprint hard", tool joints.

**3.6 CLEANING**

A. Clean exposed masonry surfaces on completion.

B. Remove mortar droppings and other foreign substances from wall surfaces.

C. First wet surfaces with clean water, then wash down with a solution of soapless detergent specially prepared for cleaning brick.

D. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.

E. Free clean surfaces from traces of detergent, foreign streaks or stains. Protect materials during cleaning operations including adjoining construction.

F. Use of muratic acid for cleaning is prohibited.

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# SECTION 04 20 00
# UNIT MASONRY

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies requirements for construction of masonry unit walls.

### 1.2 RELATED WORK

A. Mortars and grouts: Section 04 05 13, MASONRY MORTARING, Section 04 05 16, MASONRY GROUTING.

B. Masonry pointing: Section 04 05 31, MASONRY TUCK POINTING.

C. Steel lintels: Section 05 50 00, METAL FABRICATIONS.

D. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.

E. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.

### 1.3 SUBMITTALS

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

B. Samples:

1. Concrete masonry units, when exposed in finish work.
2. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.

C. Shop Drawings:

1. Special masonry shapes.
2. Drawings, showing placement of reinforcement for unit masonry work, and applicable dimensions.

D. Certificates:

1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.

E. Manufacturer's Literature and Data:

1. Anchors, ties, and reinforcement.
2. Shear keys.
3. Reinforcing bars.

### 1.4 SAMPLE PANEL

A. Before starting masonry, lay up a sample panel in accordance with Masonry Standards Joint Committee (MSJC).

1. Use masonry units from random cubes of units delivered on site.
2. Include reinforcing, ties, and anchors.

B. Use sample panels approved by Resident Engineer for standard of workmanship of new masonry work.

C. Use sample panel to test cleaning methods.

**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 the basic designation only.

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

A951-06.....Steel Wire for Masonry Joint Reinforcement.

A615/A615M-09.....Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

A675/A675M-03(R2009)....Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical PropertiesC34-03 Structural Clay Load-Bearing Wall Tile

C90-11.....Load-Bearing Concrete Masonry Units

C476-10.....Standard Specification for Grout for Masonry

C612-10.....Mineral Fiber Block and Board Thermal Insulation

C744-11.....Prefaced Concrete and Calcium Silicate Masonry Units.

D1056-07.....Flexible Cellular Materials - Sponge or Expanded Rubber

D2000-08.....Rubber Products in Automotive Applications

D2240-05(R2010).....Rubber Property - Durometer Hardness

D3574-08.....Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams

F1667-11.....Fasteners: Nails, Spikes and Staples

C. American Welding Society (AWS):

D1.4-11.....Structural Welding Code – Reinforcing Steel.

D. National Concrete Masonry Association (NCMA):

TEK 10-2B-2005.....Control Joints for Concrete Masonry Walls – Empirical Method

TEK 10-3-2003.....Control Joints for Concrete Masonry Walls – Alternative Engineered Method

E. Masonry Industry Council:

Hot and Cold Weather Masonry Construction Manual-98 (R2000).

F. Federal Specifications (FS):

FF-S-107C-00.....Screws, Tapping and Drive

G. Masonry Standards Joint Committee; Specifications for Masonry Structures TMS 602-08/ACI 530.1-08/ASCE 6-08 (2008 MSJC Book Version TMS-0402-08).

**PART 2 - PRODUCTS**

**2.1 CONCRETE MASONRY UNITS**

A. Hollow and Solid Load-Bearing Concrete Masonry Units: ASTM C90.
   1. Unit Weight: Normal weight.
   2. Fire rated units for fire rated partitions.
   3. Sizes: Modular.
   4. For molded faces used as a finished surface, use concrete masonry units with uniform fine to medium surface texture unless specified otherwise.
   5. Use bullnose concrete masonry units at corners exposed in finished work with 25 mm (1 inch) minimum radius rounded vertical exterior corners (bullnose units).

**2.2 SHEAR KEYS**

A. ASTM D2000, solid extruded cross-shaped section of rubber, neoprene, or polyvinyl chloride, with a durometer hardness of approximately 80 when tested in accordance with ASTM D2240, and a minimum shear strength of 3.5 MPa (500 psi).

B. Shear key dimensions: Approximately 70 mm by 8 mm for long flange and 38 mm by 16 mm for short flange (2-3/4 inches by 5/16 inch for long flange, and 1-1/2 inches by 5/8 inch for short flange).

**2.3 ANCHORS, TIES, AND REINFORCEMENT**

A. Steel Reinforcing Bars: ASTM A615M, deformed bars, grade as shown.

B. Joint Reinforcement:
   1. Form from wire complying with ASTM A951.
   2. Galvanized after fabrication.
   3. Width of joint reinforcement 40 mm (0.16 inches) less than nominal width of masonry wall or partition.
   4. Cross wires welded to longitudinal wires.
   5. Joint reinforcement at least 3000 mm (10 feet) in length.
   6. Joint reinforcement in rolls is not acceptable.
   7. Joint reinforcement that is crimped to form drip is not acceptable.
   8. Maximum spacing of cross wires 400 mm (16 inch) to longitudinal wires.
   9. Trussed Design:
      a. Longitudinal and cross wires not less than 4 mm (0.16 inch nominal) diameter.
      b. Longitudinal wires deformed.

C. Dovetail Anchors:
   1. Corrugated steel dovetail anchors formed of 1.5 mm (0.0598 inch) thick by 25 mm (1 inch) wide galvanized steel, 90 mm (3-1/2 inches)

long where used to anchor 100 mm (4 inch) nominal thick masonry units, 140 mm (5-1/2 inches) long for masonry units more than 100 mm (4 inches) thick.

2. Triangular wire dovetail anchor 100 mm (4 inch) wide formed of 4 mm (9 gage) steel wire with galvanized steel dovetail insert. Anchor length to extend at least 75 mm (3 inches) into masonry, 25 mm (1 inch) into 40 mm (1-1/2 inch) thick units.
3. Form dovetail anchor slots from 0.6 mm (0.0239 inch) thick galvanized steel (with felt or fiber filler).

D. Individual Ties:
1. Rectangular ties: Form from 5 mm (3/16 inch) diameter galvanized steel rod to a rectangular shape not less than 50 mm (2 inches) wide by sufficient length for ends of ties to extend within 25 mm (1 inch) of each face of wall. Ties that are crimped to form drip are not permitted.

E. Wall Ties, (Mesh or Wire):
1. Mesh wall ties formed of ASTM A82, W0.5, 2 mm, (16 gage) galvanized steel wire 13 mm by 13 mm (1/2 inch by 1/2 inch) mesh, 75 mm (3 inches) wide by 200 mm (8 inches) long.
2. Rectangular wire wall ties formed of W1.4, 3 mm, (9 gage) galvanized steel wire 50 mm (2 inches) wide by 200 mm (8 inches) long.

F. Corrugated Wall Tie:
1. Form from 1.5 mm (0.0598 inch) thick corrugated, galvanized steel 30 mm (1-1/4 inches) wide by lengths so as to extend at least 100 mm (4 inches) into joints of new masonry plus 38 mm (1-1/2 inch) turn-up.
2. Provide 5 mm (3/16 inch) hole in turn-up for fastener attachment.

G. Adjustable Steel Column Anchor:
1. Two piece anchor consisting of a 6 mm (1/4 inch) diameter steel rod to be welded to steel with offset ends, rod to permit 100 mm (4 inch) vertical adjustment of wire anchor.
2. Triangular shaped wire anchor 100 mm (4 inches) wide formed from 5 (3/16 inch) diameter galvanized wire, to extend at least 75 mm (3 inches) into joints of masonry.

H. Adjustable Steel Beam Anchor:
1. Z or C type steel strap, 30 mm (1-1/4 inches) wide, 3 mm (1/8 inch) thick.
2. Flange hook not less than 38 mm (1-1/2 inches) long.
3. Length to embed in masonry not less than 50 mm (2 inches) in 100 mm (4 inch) nominal thick masonry and 100 mm (4 inches) in thicker masonry.

4. Bend masonry end not less than 40 mm (1-1/2 inches).

I. Ridge Wall Anchors:

1. Form from galvanized steel not less than 25 mm (1 inch) wide by 5 mm (3/16 inch) thick by 600 mm (24 inches) long, plus 50 mm (2 inch) bends.
2. Other lengths as shown.

**2.4 PREFORMED COMPRESSIBLE JOINT FILLER**

A. Thickness and depth to fill the joint as specified.

B. Closed Cell Neoprene: ASTM D1056, Type 2, Class A, Grade 1, B2F1.

**2.5 ACCESSORIES**

A. Box Board:

1. Mineral Fiber Board: ASTM C612, Class 1.
2. 25 mm (1 inch) thickness.
3. Other spacing material having similar characteristics may be used subject to the Resident Engineer's approval.

B. Masonry Cleaner:

1. Detergent type cleaner selected for each type of masonry used.
2. Acid cleaners are not acceptable.
3. Use soapless type specially prepared for cleaning concrete masonry as appropriate.

C. Fasteners:

1. Concrete Nails: ASTM F1667, Type I, Style 11, 19 mm (3/4 inch) minimum length.
2. Masonry Nails: ASTM F1667, Type I, Style 17, 19 mm (3/4 inch) minimum length.
3. Screws: FS-FF-S-107, Type A, AB, SF thread forming or cutting.

**PART 3 - EXECUTION**

**3.1 JOB CONDITIONS**

A. Protection:

1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.
2. On new work protect base of wall from dirt, mortar droppings, and other materials that will stain face.

B. Cold Weather Protection:

1. Masonry may be laid in freezing weather when methods of protection are utilized.
2. Comply with MSJC and “Hot and Cold Weather Masonry Construction Manual”.

**3.2 CONSTRUCTION TOLERANCES**

A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements and as follows:

B. Maximum variation from plumb:

1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
2. In 6000 mm (20 feet) - 10 mm (3/8 inch).
3. In 12 000 mm (40 feet) or more - 13 mm (1/2 inch).

C. Maximum variation from level:

1. In any bay or up to 6000 mm (20 feet) - 6 mm (1/4 inch).
2. In 12 000 mm (40 feet) or more - 13 mm (1/2 inch).

D. Maximum variation from linear building lines:

1. In any bay or up to 6000 mm (20 feet) - 13 mm (1/2 inch).
2. In 12 000 mm (40 feet) or more - 19 mm (3/4 inch).

E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:

1. Minus 6 mm (1/4 inch).
2. Plus 13 mm (1/2 inch).

F. Maximum variation in prepared opening dimensions:

1. Accurate to minus 0 mm (0 inch).
2. Plus 6 mm (1/4 inch).

**3.3 INSTALLATION GENERAL**

A. Keep finish work free from mortar smears or spatters, and leave neat and clean.

B. Anchor masonry as specified in Paragraph, ANCHORAGE.

C. Wall Openings:

1. Fill hollow metal frames built into masonry walls and partitions solid with mortar as laying of masonry progresses.
2. If items are not available when walls are built, prepare openings for subsequent installation.

D. Tooling Joints:

1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
2. Tool while mortar is soft enough to be compressed into joints and not raked out.
3. Finish joints in exterior face masonry work with a jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
4. Tool Exposed interior joints in finish work concave unless specified otherwise.

E. Partition Height:

1. Extend partitions to overhead construction, unless shown otherwise.

F. Wall, Furring, and Partition Units:
   1. Lay out field units to provide for running bond of walls and partitions, with vertical joints in second course centering on first course units unless specified otherwise.
   2. Align head joints of alternate vertical courses.
   3. At sides of openings, balance head joints in each course on vertical center lines of openings.
   4. Use no piece shorter than 100 mm (4 inches) long.
   5. On interior partitions provide a 6 mm (1/4 inch) open joint for caulking between existing construction, exterior walls, concrete work, and abutting masonry partitions.
   6. Do not abut existing plastered surfaces except suspended ceilings with new masonry partitions.
G. Use not less than 100 mm (4 inches) nominal thick masonry for fireproofing steel columns unless shown otherwise.
H. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.
I. When new masonry partitions start on existing floors, machine cut existing floor finish material down to concrete surface.
J. Wetting and Wetting Test:
   1. Do not wet concrete masonry units before laying.
K. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.
L. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.
M. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.

**3.4 ANCHORAGE**

A. Anchorage of Abutting Masonry:
   1. Anchor interior 100 mm (4 inch) thick masonry partitions to exterior masonry walls with wall ties. Space ties at 600 mm (2 foot) maximum vertical intervals. Extend ties 100 mm (4 inches) minimum into masonry.
   2. Anchor interior masonry bearing walls or interior masonry partitions over 100 mm (4 inches) thick to masonry walls with rigid wall anchors spaced at 400 mm (16 inch) maximum vertical intervals.

3. Anchor abutting masonry walls and partitions to concrete with dovetail anchors. Install dovetail slots vertically in concrete at centerline of abutting wall or partition. Locate dovetail anchors at 400 mm (16 inch) maximum vertical intervals. Secure anchors to existing wall with two 9 mm (3/8 inch) by 75 mm (3 inch) expansion bolts or two power-driven fasteners.
4. Anchor abutting interior masonry partitions to existing concrete and existing masonry construction, with corrugated wall ties. Extend ties at least 100 mm (4 inches) into joints of new masonry. Fasten to existing concrete and masonry construction with powder actuated drive pins, nails, or other means that provides rigid anchorage. Install anchors at 400 mm (16 inch) maximum vertical intervals.

B. Masonry Furring:
1. Anchor masonry furring less than 100 mm (4 inches) nominal thick to masonry walls or to concrete with corrugated wall ties or dovetail anchors.
2. Space not over 600 mm (2 feet) on centers in both directions.

C. Anchorage to Steel Beams or Columns:
1. Use adjustable beam anchors on each flange.
2. At columns weld the 6 mm (1/4 inch) steel rod to steel columns at 300 mm (12 inch) intervals, and place wire ties in masonry courses at 400 mm (16 inches) maximum vertically.

**3.5 REINFORCEMENT**

A. Joint Reinforcement:
1. Use as joint reinforcement in CMU wythe of cavity walls and single wythe concrete masonry unit walls or partitions.
2. Locate joint reinforcement in mortar joints at 400 mm (16 inch) maximum vertical intervals.
3. Additional joint reinforcement is required in mortar joints at both 200 mm (8 inches) and 400 (16 inches) above and below windows, doors, louvers and similar openings in masonry, except where other type anchors are required for anchorage of masonry to concrete structure.
4. Joint reinforcement is required in every other course of stack bond CMU masonry.

B. Steel Reinforcing Bars:
1. Install in cells of hollow masonry units where required for vertical reinforcement and in bond beam units for bond beam horizontal reinforcement. Install in wall cavities of reinforced masonry walls where shown.
2. Use grade 60 bars if not specified otherwise.

3. Bond Beams:
   a. Form Bond beams of load-bearing concrete masonry units filled with ASTM C476 grout and reinforced with 2-#15m (#5) reinforcing steel unless shown otherwise. Do not cut reinforcement.
   b. Brake bond beams only at expansion joints and at control joints, if shown.
4. Stack Bond:
   a. Locate additional joint reinforcement in vertical and horizontal joints as shown.
   b. Anchor vertical reinforcement into the foundation or wall or bond beam below and hold in place.
   c. Provide temporary bracing for walls over 2.4 m (8 feet) tall until permanent horizontal bracing is completed.
5. Grout Openings:
   a. Leave cleanout holes in double wythe walls during construction by omitting units at the base of one side of the wall.
   b. Locate 75 mm x 75 mm (3 inch x 3 inch) minimum clean-out holes at location of vertical reinforcement.
   c. Keep grout space clean of mortar accumulation and sand debris. Clean the grout space every day using a high pressure jet stream of water, or compressed air, or industrial vacuum, or by laying wood strips on the metal ties as the wall is built. If wood strips are used, lift strips with wires as the wall progresses and before placing each succeeding course of wall ties.

**3.6 CMU CONTROL JOINTS**

A. Provide CMU control (CJ) joints at maximum spacing of 7.6 m (25 feet) o.c. in accordance with NCMA TEK 10-2B and TEK 10-3, and ACI 530.
B. Keep joint free of mortar and other debris.
C. Where joints occur in masonry walls.
   1. Install cross shaped shear keys in concrete masonry unit wythe with preformed compressible joint filler on each side of shear key unless otherwise specified.
   2. Install filler, backer rod, and sealant on exposed faces.
D. Use standard notched concrete masonry units (sash blocks) made in full and half-length units where shear keys are used to create a continuous vertical joint.
E. Interrupt steel joint reinforcement at expansion and control joints unless otherwise shown.
F. Fill opening in exposed face of expansion and control joints with sealant as specified in Section 07 92 00, JOINT SEALANTS.

**3.7 BUILDING EXPANSION AND SEISMIC JOINTS**

A. Keep joint free of mortar. Remove mortar and other debris.

B. Install non-combustible, compressible type joint filler to fill space completely except where sealant is shown on joints in exposed finish work.

C. Where joints are on exposed faces, provide depth for backer rod and sealant as specified in Section 07 92 00, JOINT SEALANTS, unless shown otherwise.

**3.8 ISOLATION SEAL**

A. Where full height walls or partitions lie parallel or perpendicular to and under structural beams or shelf angles, provide a separation between walls or partitions and bottom of beams or shelf angles not less than the masonry joint thickness unless shown otherwise.

B. Insert in the separation, a continuous full width strip of non-combustible type compressible joint filler.

C. Where exposed in finish work, cut back filler material in the joint enough to allow for the joint to be filled with sealant material specified in Section 07 92 00, JOINT SEALANTS.

**3.9 CONCRETE MASONRY UNITS**

A. Kind and Users:

1. Provide special concrete masonry shapes as required. Use solid concrete masonry units, where full units cannot be used, or where needed for anchorage of accessories.
2. Provide solid load-bearing concrete masonry units or grout the cell of hollow units at jambs of openings in walls, where structural members impose loads directly on concrete masonry, and where shown.
3. Provide rounded corner (bullnose) shapes at opening jambs in exposed work and at exterior corners.
4. Do not use brick jambs in exposed finish work.
5. Masonry assemblies shall meet the required fire resistance in fire rated partitions of type and construction that will provide fire rating as shown.

B. Laying:

1. Lay concrete masonry units with 10 mm (3/8 inch) joints, with a bond overlap of not less than 1/4 of the unit length, except where stack bond is required.
2. Do not wet concrete masonry units before laying.
3. Bond external corners of partitions by overlapping alternate courses.
4. Lay first course in a full mortar bed.
5. Set anchorage items as work progress.

6. Where ends of anchors, bolts, and other embedded items, project into voids of units, completely fill such voids with mortar or grout.
7. Provide a 6 mm (1/4 inch) open joint for caulking between existing construction, exterior walls, concrete work, and abutting masonry partitions.
8. Lay concrete masonry units with full face shell mortar beds and fill head joint beds for depth equivalent to face shell thickness.
9. Lay concrete masonry units so that cores of units, that are to be filled with grout, are vertically continuous with joints of cross webs of such cores completely filled with mortar. Unobstructed core openings not less than 50 mm (2 inches) by 75 mm (3 inches).
10. Do not wedge the masonry against the steel reinforcing. Minimum 13 mm (1/2 inch) clear distance between reinforcing and masonry units.
11. Install deformed reinforcing bars of sizes shown.
12. Steel reinforcement, at time of placement, free of loose flaky rust, mud, oil, or other coatings that will destroy or reduce bond.
13. Steel reinforcement in place before grouting.
14. Minimum clear distance between parallel bars: One bar diameter.
15. Hold vertical steel reinforcement in place by centering clips, caging devices, tie wire, or other approved methods, vertically at spacings noted.
16. Support vertical bars near each end and at intermediate intervals not exceeding 192 bar diameters.
17. Reinforcement shall be fully encased by grout or concrete.
18. Splice reinforcement or attach reinforcement to dowels by placing in contact and secured or by placing the reinforcement within 1/5 of the required bar splice length.
19. Stagger splices in adjacent horizontal reinforcing bars. Lap reinforcing bars at splices a minimum of 40 bar diameters.
20. Grout cells of concrete masonry units, containing the reinforcing bars, solid as specified under grouting.
21. Cavity and joint horizontal reinforcement may be placed as the masonry work progresses.

**3.10 GROUTING**

A. Preparation:
1. Clean grout space of mortar droppings before placing grout.
2. Close cleanouts.
3. Install vertical solid masonry dams across grout space for full height of wall at intervals of not more than 9000 mm (30 feet). Do not bond dam units into wythes as masonry headers.

4. Verify reinforcing bars are in cells of units or between wythes as shown.

B. Placing:
1. Place grout by hand bucket, concrete hopper, or grout pump.
2. Consolidate each lift of grout after free water has disappeared but before plasticity is lost.
3. Do not slush with mortar or use mortar with grout.
4. Interruptions:
   a. When grouting must be stopped for more than an hour, top off grout 40 mm (1-1/2 inch) below top of last masonry course.
   b. Grout from dam to dam on high lift method.
   c. A longitudinal run of masonry may be stopped off only by raking back one-half a masonry unit length in each course and stopping grout 100 mm (4 inches) back of rake on low lift method.

C. Puddling Method:
1. Double wythe masonry constructed grouted in lifts not to exceed 300 mm (12 inches) or less than 50 mm (2 inches) wide.
2. Consolidate by puddling with a grout stick during and immediately after placing.
3. Grout the cores of concrete masonry units containing the reinforcing bars solid as the masonry work progresses.

D. Low Lift Method:
1. Construct masonry to a height of 1.5 m (5 feet) maximum before grouting.
2. Grout in one continuous operation and consolidate grout by mechanical vibration and reconsolidate after initial water loss and settlement has occurred.

E. High Lift Method:
1. Do not pour grout until masonry wall has properly cured a minimum of 4 hours.
2. Place grout in lifts not exceeding 1.5 m (5 feet).
3. Exception: Where the following conditions are met, place grout in lifts not exceeding 3.86 m (12.67 feet).
   a. The masonry has cured for at least 4 hours.
   b. The grout slump is maintained between 254 and 279 mm (10 and 11 inches).
   c. No intermediate reinforced bond beams are placed between the top and the bottom of the pour height.

4. When vibrating succeeding lifts, extend vibrator 300 to 450 mm (12 to 18 inches) into the preceding lift to close any shrinkage cracks or separation from the masonry units.

**3.11 PLACING REINFORCEMENT**

A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on the Contract Drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 25 mm (1 inch), whichever is greater.

C. Splice reinforcement bars where shown; do not splice at other places unless accepted by the Resident Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

D. Provide not less than minimum lap as indicated on shop drawings, or if not indicated, as required by governing code.

E. Weld splices where indicated. Comply with the requirements of AWS D1.4 for welding materials and procedures.

F. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations.

G. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 15 mm (5/8 inch) on exterior face of walls and 13 mm (1/2 inch) at other locations. Lap joint reinforcement not less than 150 mm (6 inches) at ends. Use prefabricated “L” and “T” sections to provide continuity at corners and intersections. Cut and bend joint reinforcement as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

H. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

I. Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

**3.12 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY**

A. Do not wet concrete masonry units (CMU).

B. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 10 mm (3/8 inch) joints.

C. Where solid CMU units are shown, lay with full mortar head and bed joints.

D. Walls:

1. Pattern Bond: Lay CMU wall units in 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, bond beams and other special conditions.
2. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
3. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

E. Grouting:

1. Use “Fine Grout” per ASTM C476 for filling spaces less than 100 mm (4 inches) in one or both horizontal directions.
2. Use “Coarse Grout” per ASTM C476 for filling 100 mm (4 inch) spaces or larger in both horizontal directions.
3. Grouting Technique: At the Contractor’s option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

F. Low-Lift Grouting:

1. Provide minimum clear dimension of 50 mm (2 inches) and clear area of 5160 $mm^2$ (8 square inches) in vertical cores to be grouted.
2. Place vertical reinforcement prior to grouting of CMU. Extend above elevation of maximum pour height as required for splicing. Support

in position at vertical intervals not exceeding 192 bar diameters nor 3 m (10 feet).

3. Lay CMU to maximum pour height. Do not exceed 1.5 m (5 foot) height, or if bond beam occurs below 1.5 m (5 foot) height, stop pour 38 mm (1-1/2 in) below top of bond beam.
4. Pour grout using chute container with spout or pump hose. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 38 mm (1-1/2 inches) below top course of pour.
5. Bond Beams: Stop grout in vertical cells 38 mm (1-1/2 inches) below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

G. High-Lift Grouting:

1. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension and area is 75 mm (3 inches) and 6450 $mm^2$ (10 square inches), respectively.
2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.
3. Use units with one face shell removed and provide temporary supports for units above, or cut openings in one face shell.
4. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
5. Limit grout lifts to a maximum height of 1.5 m (5 feet) and grout pour to a maximum height of 7.3 m (24 feet), for single wythe hollow concrete masonry walls, unless otherwise indicated.
6. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 3 m (10 feet).
7. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosed before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
8. Where reinforcement is prefabricated into cage units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.
9. Place horizontal beam reinforcement as the masonry units are laid.

10. Embed lateral tie reinforcement in mortar joints where indicated. Place as masonry units are laid, at vertical spacing shown.
11. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than 4.1 mm diameter (8 gage) wire ties spaced 400 mm (16 inches) o.c. for members with 500 mm (20 inches) or less side dimensions, and 200 mm (8 inches) o.c. for members with side dimensions exceeding 500 mm (20 inches).
12. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
13. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.
14. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Resident Engineer.
15. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 1.5 m (5 feet). Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Mechanically consolidate each grout lift during pouring operation.
16. Place grout in beams over openings in one continuous pour.
17. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 25 mm (1 inch) of vertically reinforced cavities, during construction of masonry.
18. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 38 mm (1-1/2 inches) of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

**3.13 CLEANING AND REPAIR**

A. General:
   1. Clean exposed masonry surfaces on completion.
   2. Protect adjoining construction materials and landscaping during cleaning operations.
   3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
   4. Remove mortar droppings and other foreign substances from wall surfaces.

B. Concrete Masonry Units:
   1. Immediately following setting, brush exposed surfaces free of mortar or other foreign matter.
   2. Allow mud to dry before brushing.

**3.14 WATER PENETRATION TESTING**

A. Seven (7) days before plastering or painting, in the presence of Resident Engineer, test solid exterior masonry walls for water penetration.

B. Direct water on masonry for a period of one hour at a time when wind velocity is less than five miles per hour.

C. Should moisture appear on inside of walls tested, make additional tests at other areas as directed by Resident Engineer.

D. Correct the areas showing moisture on inside of walls, and repeat test at repaired areas, to insure that moisture penetration has been stopped.

E. Make water test at locations to be determined by Resident Engineer.

- - - E N D - - -

# SECTION 05 50 00
# METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall and Ceiling Mounted Items: (12, 14A, 14C).
2. Frames: (24E).
3. Guards.
4. Covers and Frames for Pits and Trenches.
5. Gratings.
6. Loose Lintels.

### 1.2 RELATED WORK

A. Prime and finish painting: Section 09 91 00, PAINTING.

B. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

### 1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data: For each manufactured item.

| | |
|---|---|
| Grating, each type | |

C. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

D. Manufacturer's Certificates:

1. Anodized finish as specified.

E. Design Calculations for specified live loads including dead loads.

**1.4 QUALITY ASSURANCE**

A. Each manufactured 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 product type shall be the same and be made by the same manufacturer.

C. Assembled product 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 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 of Mechanical Engineers (ASME):

B18.6.1-97.....Wood Screws

B18.2.2-87(R2005).....Square and Hex Nuts

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

A36/A36M-08.....Structural Steel

A48-03(R2008).....Gray Iron Castings

A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-10.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A312/A312M-09.....Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A653/A653M-10.....Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
C1107-08.....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
F436-10.....Hardened Steel Washers
F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs
F1667-11.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):
D1.1-10.....Structural Welding Code Steel
D1.2-08.....Structural Welding Code Aluminum
D1.3-08.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual
MBG 531-09.....Metal Bar Grating Manual
MBG 532-09.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:
SP 1-04.....No. 1, Solvent Cleaning
SP 2-04.....No. 2, Hand Tool Cleaning
SP 3-04.....No. 3, Power Tool Cleaning

## PART 2 - PRODUCTS

### 2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.

B. Gratings and Covers: 500 kg/m$^2$ (100 pounds per square foot).

### 2.2 MATERIALS

A. Structural Steel: ASTM A36.

B. Stainless Steel: ASTM A167, Type 302 or 304.

C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.

D. Steel Pipe: ASTM A53.
1. Galvanized for exterior locations.

2. Type S, Grade A unless specified otherwise.
3. NPS (inside diameter) as shown.

E. Cast-Iron: ASTM A48, Class 30, commercial pattern.

F. Malleable Iron Castings: A47.

G. Primer Paint: As specified in Section 09 91 00, PAINTING.

H. Stainless Steel Tubing: ASTM A269, type 302 or 304.

I. Modular Channel Units:

1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
2. Form channel with in turned pyramid shaped clamping ridges on each side.
3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.

J. Grout: ASTM C1107, pourable type.

**2.3 HARDWARE**

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

B. Fasteners:

1. Bolts with Nuts:
   a. ASME B18.2.2.
   b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
   c. ASTM F468 for nonferrous bolts.
   d. ASTM F593 for stainless steel.

2. Screws: ASME B18.6.1.
3. Washers: ASTM F436, type to suit material and anchorage.
4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

**2.4 FABRICATION GENERAL**

A. Material:
1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:
1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections:
1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for Rivets and Bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members, machine screws or bolts.

D. Fasteners and Anchors:
1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation

of the members or causing failure of the anchor or fastener, and suit the sequence of installation.

3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

E. Workmanship:

1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.
   c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
   d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
   e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
   f. Prepare members for the installation and fitting of hardware.
   g. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.

3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
   b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
5. Cutting and Fitting:
   a. Accurately cut, machine and fit joints, corners, copes, and miters.
   b. Fit removable members to be easily removed.
   c. Design and construct field connections in the most practical place for appearance and ease of installation.
   d. Fit pieces together as required.
   e. Fabricate connections for ease of assembly and disassembly without use of special tools.
   f. Joints firm when assembled.
   g. Conceal joining, fitting and welding on exposed work as far as practical.
   h. Do not show rivets and screws prominently on the exposed face.
   i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:
1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
2. Aluminum: NAAMM AMP 501.
   a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.

b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
c. Painted: AA-C22R10.

3. Steel and Iron: NAAMM AMP 504.
   a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
   b. Surfaces Exposed in Finished Work:
      1) Finish smooth rough surfaces and remove projections.
      2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
   c. Shop Prime Painting:
      1) Surfaces of Ferrous metal:
         a) Items not specified to have other coatings.
         b) Galvanized surfaces specified to have prime paint.
         c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
         d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
         e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
      2) Non Ferrous Metals: Comply with MAAMM-500 series.
4. Stainless Steel: NAAMM AMP-504 Finish No. 4.

G. Protection:
1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

**2.5 SUPPORTS**

A. General:
1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Ceiling Hung Toilet Stall:
   1. Use a continuous steel channel above pilasters with hangers centered over pilasters.
   2. Make provision for installation of stud bolts in lower flange of channel.
   3. Provide a continuous steel angle at wall and channel braces spaced as shown.
   4. Use threaded rod hangers.
   5. Provide diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.

C. For Wall Mounted Items:
   1. For items supported by metal stud partitions.
   2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
   3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
   4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.
   5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
   6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

D. For Ceiling Mounted Items:
   1. Fabricate concealed components of structural steel shapes unless shown otherwise.
   2. Continuously weld connections where welds shown.
   3. Use modular channel where shown with manufacturers bolts and fittings.
   4. Fabricate hangers braces, and track of modular channel units assembly as shown.
   5. Fabricate steel plates for anchor to structure above.
   6. Fabricate as shown to suit equipment furnished.
   7. Drill leveling plate where required for bolts.
   8. Drill for anchor bolts of suspended item.
   9. Drill for fasteners.

**2.6 FRAMES**

A. Channel Door Frames:

1. Fabricate of structural steel channels of size shown.
2. Miter and weld frames at corners.
3. Where anchored to masonry or embedded in concrete, weld to back of frame at each jamb, 5 mm (3/16 inch) thick by 44 mm (1-3/4 inch) wide steel strap anchors with ends turned 50 mm (2 inches), and of sufficient length to extend at least 300 mm (12 inches) into wall. Space anchors 600 mm (24 inches) above bottom of frame and 600 mm (24 inches) o.c. to top of jamb. Weld clip angles to bottom of jambs and provide holes for expansion bolts.
4. Where anchored to concrete or masonry in prepared openings, drill holes at jambs for anchoring with expansion bolts. Weld clip angles to bottom of frame and provide holes for expansion bolt anchors as shown. Drill holes starting 600 mm (24 inches) above bottom of frame and 600 mm (24 inches) o.c. to top of jamb and at top of jamb. Provide pipe spacers at holes welded to channel.
5. Where closure plates are shown, continuously weld them to the channel flanges.
6. Weld continuous 19 x 19 x 3 mm (3/4 x 3/4 x 1/8 inch) thick steel angles to the interior side of each channel leg at the head and jambs to form a caulking groove.
7. Prepare frame for installation of hardware specified in Section 08 71 00, DOOR HARDWARE.
   a. Cut a slot in the lock jamb to receive the lock bolt.
   b. Where shown use continuous solid steel bar stops at perimeter of frame, weld or secure with countersunk machine screws at not more than 450 mm (18 inches) on center.

**2.7 GUARDS**

A. Wall Corner Guards:

1. Fabricate from steel angles and furnish with anchors as shown.
2. Continuously weld anchor to angle.

**2.8 COVERS AND FRAMES FOR PITS AND TRENCHES**

A. Fabricate covers to support live loads specified.

B. Galvanized steel members after fabrication in accordance with ASTM A123, G-90 coating.

C. Steel Covers:
   1. Use 6 mm (1/4 inch) thick floor plate for covers unless otherwise shown. Use gratings where shown as specified in paragraph GRATINGS. Use smooth floor plate unless noted otherwise.
   2. Provide clearance at all sides to permit easy removal of covers.
   3. Make cutouts within 6 mm (1/4 inch) of penetration for passage of pipes and ducts.
   4. Drill covers for flat head countersunk screws.
   5. Make cover sections not to exceed 2.3 $m^2$ (25 square feet) in area and 90 kg (200 pounds) in weight.
   6. Fabricate trench cover sections not be over 900 mm (3 feet) long and if width of trench is more than 900 mm (3 feet) or over, equip one end of each section with an angle or "T" bar stiffener to support adjoining plate.
   7. Use two, 13 mm (1/2 inch) diameter steel bar flush drop handles for each cover section.

D. Steel Frames:
   1. Form frame from structural steel angles as shown. Where not shown use 63 x 63 x 6 mm (2-1/2 x 2-1/2 x 1/4 inch) angles for frame openings over 1200 mm (4 feet) long and 50 x 50 x 6 mm (2 ix 2 x 1/4 inch) for frame openings less than 1200 mm (4 feet).
   2. Fabricate intermediate supporting members from steel "T's" or angles; located to support cover section edges.
   3. Where covers are required use steel border bars at frames so that top of cover will be flush with frame and finish floor.
   4. Weld steel strap anchors to frame. Space straps not over 600 mm (24 inches) o.c., not shown otherwise between end anchors. Use 6 x 25 x 200 mm (1/4 x 1 x 8 inches) with 50 mm (2 inch) bent ends strap anchors unless shown otherwise.
   5. Drill and tap frames for screw anchors where plate covers occur.

**2.9 GRATINGS**

A. Fabricate gratings to support live loads specified and a concentrated load as specified.

B. Provide clearance at all sides to permit easy removal of grating.

C. Make cutouts in gratings with 6 mm (1/4 inch) minimum to 25 mm (one inch) maximum clearance for penetrations or passage of pipes and ducts. Edge band cutouts.

D. Fabricate in sections not to exceed 2.3 $m^2$ (25 square feet) in area and 90 kg (200 pounds) in weight.

E. Fabricate sections of grating with end-banding bars.

F. Fabricate angle frames and supports, including anchorage as shown.

1. Fabricate intermediate supporting members from "T's" or angles.
2. Locate intermediate supports to support grating section edges.
3. Fabricate frame to finish flush with top of grating.
4. Locate anchors at ends and not over 600 mm (24 inches) o.c.
5. Butt or miter, and weld angle frame at corners.

G. Steel Bar Gratings:

1. Fabricate grating using steel bars, frames, supports and other members shown in accordance with Metal Bar Grating Manual.
2. Galvanize steel members after fabrication in accordance with ASTM A123, G-90 for exterior gratings, gratings in concrete floors, and interior grating where specified.
3. Interior gratings: Prime paint unless specified galvanized.
4. Use serrated bars for interior gratings.

**2.10 LOOSE LINTELS**

A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.

B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.

C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.

1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).

D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).

E. Provide bearing plates for lintels where shown.

F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.

G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.

H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.

1. Provide temporary bracing for such items until concrete or masonry is set.
2. Place in accordance with setting drawings and instructions.
3. Build strap anchors, into masonry as work progresses.

C. Set frames of gratings, covers, corner guards, and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.

D. Field weld in accordance with AWS.

1. Design and finish as specified for shop welding.
2. Use continuous weld unless specified otherwise.

E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.

F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

H. Secure escutcheon plate with set screw.

**3.2 INSTALLATION OF SUPPORTS**

A. Anchorage to Structure:

1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
2. Secure supports to concrete inserts by bolting or continuous welding as shown.

3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
4. Secure steel plate or hat channels to studs as detailed.

B. Ceiling Hung Toilet Stalls:
1. Securely anchor hangers of continuous steel channel above pilasters to structure above.
2. Bolt continuous steel angle at wall to masonry or weld to face of each metal stud.
3. Secure brace for steel channels over toilet stall pilasters to wall angle supports with bolts at each end spaced as shown.
4. Install diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
5. Install stud bolts in lower flange of channel before installing furred down ceiling over toilet stalls.
6. Install support for ceiling hung pilasters at entrance screen to toilet room similar to toilet stall pilasters.

C. Supports for Wall Mounted items:
1. Locate center of support at anchorage point of supported item.
2. Locate support at top and bottom of wall hung cabinets.
3. Locate support at top of floor cabinets and shelving installed against walls.
4. Locate supports where required for items shown.

D. Support for Ceiling Mounted Items:
1. Bolt modular steel channel frames to hangers as shown, anchored to structure above.
2. Fasten frames with modular channel manufacturer's fittings, bolts, and nuts. Space modular channel supports and hangers as shown and as required to suit equipment furnished.
3. Install closure plates in channels at ceiling where channel opening is visible. Coordinate and cut plates to fit tight against equipment anchors after equipment anchors are installed.
4. Anchor support to structure above as shown.
5. Set leveling plate as shown level with ceiling.

**3.3 COVERS AND FRAMES FOR PITS AND TRENCHES**

A. Set frame and cover flush with finish floor.

B. Secure plates to frame with flat head countersunk screws.

C. Set gratings loose in drainage trenches or over pits unless shown anchored.

**3.4 OTHER FRAMES**

A. Set frame flush with surface unless shown otherwise.

B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.

**3.5 GUARDS**

A. Steel Angle Corner Guards:

1. Build into masonry as the work progress.
2. Set angles flush with edge of opening and finish floor or wall or as shown.
3. At existing construction fasten angle and filler piece to adjoining construction with 16 mm (5/8 inch) diameter by 75 mm (3 inch) long expansion bolts 450 mm (18 inches) on center.
4. Install guard angles at edges of trenches and elsewhere as shown.

**3.6 GRATINGS**

A. Set grating flush with finish floor; top of curb, or areaway wall. Set frame so that horizontal leg of angle frame is flush with face of wall except when frame is installed on face of wall.

B. Set frame in formwork before concrete is placed.

C. Where grating terminates at a wall bolt frame to concrete or masonry with expansion bolts unless shown otherwise.

D. Secure removable supporting members in place with stainless steel bolts.

E. Bolt gratings to supports.

**3.7 STEEL LINTELS**

A. Use lintel sizes and combinations shown or specified.

B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.

C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

**3.8 CLEAN AND ADJUSTING**

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

- - - E N D - - -

# SECTION 06 10 00
# ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies wood blocking, sheet material, and rough hardware.

### 1.2 RELATED WORK

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

### 1.3 SUBMITTALS

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

B. Shop Drawings showing fasteners, connections and dimensions, and relationship to adjacent materials.

### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 150 mm (6 inches) above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

### 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 of Mechanical Engineers (ASME):
B18.2.1-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87.....Square and Hex Nuts
B18.6.1-97.....Wood Screws

C. American Plywood Association (APA):
E30-07.....Engineered Wood Construction Guide

D. American Society for Testing And Materials (ASTM):
A47-99(R2009).....Ferritic Malleable Iron Castings
A48-03(R2008).....Gray Iron Castings

A653/A653M-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-11.....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

C1002-07(2013).....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs

F844-07.....Washers, Steel, Plan (Flat) Unhardened for General Use

F1667-08.....Nails, Spikes, and Staples

E. Federal Specifications (Fed. Spec.):

MM-L-736C.....Lumber; Hardwood

F. Commercial Item Description (CID):

A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

G. Military Specification (Mil. Spec.):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

H. U.S. Department of Commerce Product Standard (PS)

PS 1-95.....Construction and Industrial Plywood

PS 20-05.....American Softwood Lumber Standard

## PART 2 - PRODUCTS

### 2.1 LUMBER

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Lumber Other Than Structural:
   1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
   2. Blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.
C. Sizes:
   1. Conforming to Prod. Std., PS20.
   2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.
D. Moisture Content:
   1. At time of delivery and maintained at the site.
   2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
   3. Lumber over 50 mm (2 inches) thick: 25 percent or less.
E. Fire Retardant Treatment:
   1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
   2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

**2.2 PLYWOOD**

A. Comply with Prod. Std., PS 1.
B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
C. Panel:
   1. APA rated Exposure 1; panel grade CD or better.
   2. Dimensions as indicated on drawings.

**2.3 ROUGH HARDWARE AND ADHESIVES**

A. Anchor Bolts:
   1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
   2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 13 mm (1/2 inch) bolt unless shown otherwise.

C. Washers:

1. ASTM F844.
2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:

1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
2. ASTM F1667:
   a. Common: Type I, Style 10.
   b. Concrete: Type I, Style 11.
   c. Barbed: Type I, Style 26.
   d. Masonry: Type I, Style 27.
   e. Use special nails designed for use with ties, strap anchors, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

**PART 3 - EXECUTION**

**3.1 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS**

A. Fasteners:

1. Bolts:
   a. Fit bolt heads and nuts bearing on wood with washers.
   b. Countersink bolt heads flush with the surface of nailers.
   c. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
   d. Use toggle bolts to hollow masonry or sheet metal.
   e. Use bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 600 mm (24 inch) intervals between end bolts. Use clips to beam flanges.

2. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
   a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
   b. ASTM C 954 for steel over 0.84 mm (0.033 inch) thick.
3. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.
4. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.

B. Blocking, Nailers, and Sheet Materials:
1. Install blocking, nailers, and sheet materials where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking:
   a. Stagger end joints between upper and lower pieces.
   b. Nail at ends and not over 600 mm (24 inches) between ends.
   c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.

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# SECTION 06 20 00
# FINISH CARPENTRY

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies exterior and interior millwork.

B. Items specified.

1. Plastic laminate wood cabinets
2. Plastic laminate wall shelves

### 1.2 RELATED WORK

A. Fabricated Metal brackets, bench supports and countertop legs: Section 05 50 00, METAL FABRICATIONS.

B. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.

C. Wood doors: Section 08 14 00, INTERIOR WOOD DOORS.

D. Countertops: Division 12, FURNISHINGS.

E Electrical light fixtures and duplex outlets: Division 26, ELECTRICAL.

### 1.3 SUBMITTALS

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

B. Shop Drawings:

1. Millwork items – Half size scale for sections and details 1:50 (1/4-inch) for elevations and plans. Indicate AWS Standards.
2. Show construction materials, dimensions, hardware, jointing details, plastic laminate grades, accessories, and installation.

C. Samples:

1. Plastic laminate finished plywood or particleboard, 150 mm by 300 mm (6 inches by 12 inches).
2. Edge Strip Molding, manufacturer’s full range of standard colors for selection.
3. Hinges and exposed hardware items, in specified finish.

D. Certificates:

1. Indicating fire retardant treatment of materials meet the requirements specified.
2. Indicating moisture content of materials meet the requirements specified.

E. List of acceptable sealers for fire retardant materials.

F. Manufacturer's literature and data:

1. Care and maintenance of plastic surfaces.
2. Finish hardware.

**1.4 QUALITY ASSURANCE**

Casework and Shelves: Architectural Woodwork Standards (AWS), Section 10.

**1.5 DELIVERY, STORAGE AND HANDLING**

A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.

B. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by Resident Engineer. Store at a minimum temperature of 21 degrees C (70 degrees F) for not less than ten (10) days before installation.

C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

**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 of Testing and Materials (ASTM):
D4673-02(2008).....Standard Classification System for Acrylonitrile-Butadiene-Styrene (ABS) Plastics and Alloys Molding and Extrusion Materials
E84-10.....Surface Burning Characteristics of Building Materials

C. American Hardboard Association (AHA):
A135.4-04.....Basic Hardboard

D. Builders Hardware Manufacturers Association (BHMA):
A156.9-03.....Cabinet Hardware
A156.11-10.....Cabinet Locks
A156.16-08.....Auxiliary Hardware

E. Composite Panel Association (CPA):
CPA A208.1 and A208.2 (2009) Medium Density Fiberboard (MDF) For Interior Applications

F. National Particleboard Association (NPA):
A208.1-09.....Wood Particleboard

G. Architectural Woodwork Institute (AWI):
AWI-09.....Architectural Woodwork Standards (AWS)

H. National Electrical Manufacturers Association (NEMA):
LD 3-05.....High-Pressure Decorative Laminates

I. U.S. Department of Commerce, Product Standard (PS):
PS20-10.....American Softwood Lumber Standard

J. Military Specification (Mil. Spec):
MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

K. Federal Specifications (Fed. Spec.):
A-A-1922A.....Shield Expansion
A-A-1936.....Contact Adhesive
FF-N-836D.....Nut, Square, Hexagon Cap, Slotted, Castle
FF-S-111D(1).....Screw, Wood
MM-L-736(C).....Lumber, Hardwood

**PART 2 – PRODUCTS**

**2.1 BIO-BASED MATERIAL**

Bio-based Materials: For products designated by the USDA's Bio-Preferred program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specification section. For more information regarding the product categories covered by the Bio-Preferred program, visit http://www.bio-preferred.gov

**2.2 LUMBER**

A. Grading and Marking:
1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Sizes:
1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.
2. Millwork: Actual size as shown or specified.

C. Hardwood: MM-L-736, species as specified for each item.

D. Softwood: PS-20, exposed to view appearance grades:
1. Use C select or D select, vertical grain for transparent finish including stain transparent finish.
2. Use Prime for painted or opaque finish.

**2.3 PLYWOOD**

A. Softwood Plywood:

1. Prod. Std.
2. Grading and Marking:
   a. Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
   b. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade, and compliance with PS1.
3. Plywood, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.
4. Plastic Laminate Plywood Cores:
   a. Exterior Type, and species group.
   b. Veneer Grade: A-C.
5. Shelving Plywood:
   a. Interior Type, any species group.
   b. Veneer Grade: A-B or B-C.
6. Other: As specified for item.

B. Hardwood Plywood:
1. HPVA: HP.1
2. Species of face veneer shall be as shown or as specified in connection with each particular item.
3. Inside of Building:
   a. Use Type II (interior) A grade veneer for transparent finish.
   b. Use Type II (interior) Sound Grade veneer for paint finish.
4. On Outside of Building:
   a. Use Type I, (exterior) A Grade veneer for natural or stained and varnish finish.
   b. Use Type I, (exterior) Sound Grade veneer for paint finish.
5. Use rotary cut white birch, unless indicated otherwise.

**2.4 PANEL PRODUCTS**

A. Particleboard: NPA A208.1
1. Plastic Laminate Particleboard Cores:
   a. Use Type 1, Grade 1-M-2, density 45 pcf; moisture resistant.
   b. Particleboard made from wood particles, with binder containing no urea-formaldehyde resin.

B. Fiberboard: CPA A208.2.
1. Plastic Laminate Medium Density Fiberboard Cores:
   a. Use Grade MD.

b. Medium density fiberboard made from wood fiber, with binder containing no urea-formaldehyde resin.

C. Hardboard: ANSI/AHA A135.4, 6 mm (1/4-inch) thick unless indicated otherwise.

**2.5 HIGH PRESSURE PLASTIC LAMINATE**

A. NEMA LD-3 and ANSI A161.2.

B. Exposed decorative surfaces, both sides of cabinet doors, and for items having plastic laminate finish.

C. Horizontal General Purpose Standard (HGS) Grade.

1. Plastic laminate shall be 1.22 mm (plus or minus 0.127 mm) (0.048 inches (plus or minus 0.005 inches)) in thickness; where postforming is not required.

D. Vertical General Purpose Standard (VGS) Grade:

1. Plastic laminate shall be 0.71 mm (plus or minus 0.012 mm) (0.028 inches (plus or minus 0.004 inches)) in thickness; where postforming is not required.

E. Horizontal General Purpose Postformable (HGP) Grade:

1. Plastic laminate shall be 1.07 mm (plus or minus 0.127 mm) (0.042 inches (plus or minus 0.005 inches)) in thickness.

F. Cabinet Liner Stanard (CLS) Grade:

1. Interiors including Shelving: Plastic laminate shall be 0.51 mm (0.020-inch) in thickness.

a. Plastic laminate clad plywood or particle board.

G. Backing Sheet (BK) Grade:

1. Undecorated backing sheet grade laminate used on bottom of plastic laminate panel substrates; backing sheet shall be 0.51 mm (0.020-inch) in thickness.

2. Provide for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

**2.6 ACCESSORIES**

A. Setting Adhesives:

1. For Plastic Laminate: Fed. Spec. A-A-1936.

2. For Interior Millwork: Use adhesives as recommended by AWI.

B. Sealants: Silicone based, mildew resistant, as provided or recommended by plastic manufacturer. Color to match plastic.

**2.7 STAINLESS STEEL**

ASTM A167, Type 302 or 304.

**2.8 ALUMINUM CAST**

ASTM B26.

**2.9 ALUMINUM EXTRUDED**

ASTM B221.

**2.10 HARDWARE**

A. Rough Hardware:
   1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electric-galvanizing process. Galvanized where specified.
   2. Fasteners:
      a. Bolts with Nuts: FF-N-836.
      b. Expansion Bolts: A-A-1922A.
      c. Screws: Fed. Spec. FF-S-111.

B. Finish Hardware:
   1. Cabinet Hardware: ANSI A156.9.
      a. Door/Drawer Pulls: B02011. Door in seismic zones: B03182.
      b. Drawer Slides: B05051 for drawers over 150 mm (6 inches) deep, B05052 for drawers 75 mm to 150 mm 3 to 6 inches) deep, and B05053 for drawers less than 75 mm (3 inches) deep.
      c. Adjustable Shelf Pin Holes and Supports in Cabinets: 6 mm (1/4–inch) diameter pin holes and L-shaped steel pins with bright nickel or zinc finish, 4 supports per shelf.
      d. Concealed Hinges: B1601, minimum 110 degree opening.
      e. Butt Hinges: B01361, for flush doors, B01381 for inset lipped doors, and B01521 for overlay doors.
      f. Self-Closing Cabinet Hinges, concealed: Hafele Grass TIOMOS, model and quantity as required for proper door operation, or equal.
      g. Cabinet Door Catch: B0371 or B03172.
      h. Vertical Slotted Wall Shelf Standards: B04103 with shelf brackets B04113, sized for shelf depth.
   2. Cabinet Locks: ANSI A156.11.
      a. Drawers and Hinged Door: E07262.
   3. Edge Strips Moldings:
      a. Driven type "T" shape with serrated retaining stem; ABS plastic to match plastic laminate color, stainless steel, or 3 mm (1/8 inch) thick extruded aluminum.
   4. Rubber Molding:
      a. Rubber standard stock and in longest lengths practicable.
      b. Design for closures at joints with walls and adhesive anchorage.
      c. Adhesive as recommended by molding manufacturer.

**2.11 MOISTURE CONTENT**

A. Moisture content of lumber and millwork at time of delivery to site.
   1. Interior finish lumber, trim, and millwork 32 mm (1-1/4 inches) or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
   2. Exterior treated or untreated finish lumber and trim 100 mm (4 inches) or less in nominal thickness: 15 percent.
   3. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

**2.12 FIRE RETARDANT TREATMENT**

A. Where wood members and plywood are specified to be fire retardant treated, the treatment shall be in accordance with Mil. Spec. MIL-L19140.
B. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings.
C. Each piece of treated material shall bear identification of the testing agency and shall indicate performance in accordance with such rating of flame spread and smoke developed.
D. Treat wood for maximum flame spread of 25 and smoke developed of 25.
E. Fire Resistant Softwood Plywood:
   1. Use Grade A, Exterior, plywood for treatment.
   2. Meet the following requirements when tested in accordance with ASTM E84.
      a. Flame spread: 0 to 25.
      b. Smoke developed: 100 maximum
F. Fire Resistant Hardwood Plywood:
   1. Core: Fire retardant treated softwood plywood.
   2. Hardwood face and back veneers untreated,
   3. Factory seal panel edges, to prevent loss of fire retardant salts.

**2.13 FABRICATION**

A. General:
   1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
   2. Finish woodwork shall be free from pitch pockets.
   3. Except where special profiles are shown, trim shall be standard stock molding and members of the same species.
   4. Plywood shall be not less than 13 mm (1/2 inch), unless otherwise shown or specified.
   5. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.

6. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded a shown.
7. Interior trim and items of millwork to be painted may be fabricated from jointed, built-up, or laminated members, unless otherwise shown on drawings or specified.
8. Plastic Laminate Work:
   a. Factory glued to either a plywood or a particle board core, thickness as shown or specified.
   b. Cover exposed edges with plastic laminate, except where aluminum, stainless steel, or plastic molded edge strips are shown or specified. Use plastic molded edge strips on 19 mm (3/4-inch) molded thick or thinner core material.
   c. Use backing sheet on concealed large panel surface when decorative face does not occur.

B. Shelves and Rods:
1. Cut mounting strips from 25 mm by 100 mm (1 by 4 inches) softwood stock, with exposed edge slightly rounded.
2. Cut wood shelf from softwood 1 inch stock, of width shown, exposed edge slightly rounded. Option: Use 19 mm (3/4 inch) thick plywood with 19 mm (3/4 inch) softwood edge nosing on exposed edge, slightly rounded.
3. Plastic laminate covered, 19 mm (3/4 inch) thick plywood or particle board core with edges and ends having plastic molded edge strips. Size, finish and number as shown.
4. Rod or Closet Bar: L03131. Combination Garment and Shelf Support, intermediate support for closet bar: B04051 for rods over 1800 mm (6 feet) long.

## PART 3 - EXECUTION

### 3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain work areas and storage areas to a minimum temperature of 21 degrees C (70 degrees F) for not less than ten (10) days before and during installation of interior millwork.

B. Do not install finish lumber or millwork in any room or space where wet process systems such as painting, concrete, masonry, or plaster work is not complete and dry.

### 3.2 INSTALLATION

A. General:
1. Secure trim with fine finishing nails, screws, or glue as required.

2. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
3. Seal cut edges of fire retardant treated wood materials with a certified acceptable sealer.
4. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
5. Plumb and level items unless shown otherwise.
6. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

B. Shelves:
1. Install vertical slotted shelf standards, ANSI A156.9, B04103 to studs with toggle bolts through each fastener opening. Double slotted shelf standards may be used where adjacent shelves terminate.
   a. Install brackets ANSI A156.9, B04113, providing supports for shelf not over 900 mm (36 inches) on center and within 13 mm (1/2 inch) of shelf end unless shown otherwise.
   b. Install shelves on brackets so front edge is restrained by bracket.

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# SECTION 07 01 05
# ROOF MAINTENANCE AND REPAIR

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies alteration work and repairs to existing roofing where new penetrations and/or damages have occurred as a result of Project modifications.

### 1.2 EXISTING WARRANTY

A. Verify with VAMC roof warranty.

B. Notify insuring agency of intent to modify and repair, and obtain instructions concerning materials and methods required to maintain integrity of the warranty. Furnish certificate from agency indicating acceptance and incorporation of repairs in the existing warranty.

C. For all work on roofs, obtain certificate from roof assembly manufacturer(s) that existing (no dollar-limit) guarantees remain in effect.

### 1.3 QUALITY CONTROL

A. Installer Qualifications:

1. Licensed or approved in writing by insuring agency and certified by roofing membrane manufacturer to perform work under existing warranty requirements.

### 1.4 SUBMITTALS

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

B. Submit temporary protection plan of reroofing and repair areas.

C. Shop Drawings: Include plans, sections, details, base flashings and terminations, and attachments.

D. Certificates:

1. Installer Certificate: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to make roof alterations and repairs to existing roofing and warranty will remain in effect.

2. Insuring Agency Certificate: Signed by insuring agency stating that existing roof warranty includes and encompasses repairs made in conjunctions with work of this Project.

3. Roof Assembly Manufacturer’s Certificate: Signed by membrane manufacturer stating that existing roof warranty includes and encompasses repairs made in conjunction with work of this Project.

E. Manufacturer's Literature and Data: Roofing assembly materials compatible with existing roof assembly.

**1.5 ENVIRONMENTAL REQUIREMENTS**

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing assembly materials to be installed accordance with manufacturer's written instructions and warranty requirements.

B. Environmental Controls: Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

C. Protection of Interior Spaces: Refer to Section 01 00 00, GENERAL REQUIREMENTS.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Provide materials compatible with existing roofing materials. Match or exceed quality, weights type, and finishes of existing materials. Provide, as applicable, but do not be limited to:

1. Vapor retarders.
2. Adhesives.
3. Insulation materials.
4. Membranes.
5. Bitumen.
6. Surface coatings.
7. Roofing spar or ballast.
8. Base flashings.
9. Metal flashings.
10. Expansion joint materials.
11. Cant strips.
12. Pipe seals.
13. Roof walkways: Match existing pads.

**PART 3 - EXECUTION**

**3.1 TEMPORARY PROTECTION**

Install temporary protection at the end of day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent. Comply with approved temporary protection plan.

**3.2 INSTALLATION**

A. Where new roof top equipment, pipe vents, and similar roof penetrations occur, install new roofing materials in strict accordance with material manufacturer or insuring agency instructions, whichever is more stringent.

B. Repair damages caused by foot traffic and movement of tools, equipment, and products across existing roof surface.

C. Finished work shall be thorough, uniform, neat in appearance, and watertight.

D. Roof Walkways: Install walkway pads as used on existing roof system.

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# SECTION 07 16 16
# CEMENTITIOUS CRYSTALLINE WATERPROOFING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies cementitious crystalline waterproofing slurry for use at interface of existing concrete slab construction joints with new concrete pour.

### 1.2 QUALITY ASSURANCE

A. Installer approved by product manufacturer.

### 1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Product data sheets, details, and installation instructions.
2. Manufacturer letter of approval of installer.

### 1.4 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):

C33/C33M-13.....Concrete Aggregates
C144-11.....Aggregate for Masonry Mortar
C150/C150M-12.....Portland Cement
C267-01(2012).....Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes

C. Army Corps of Engineers (USACE):

CRD-C 48-92.....Water Permeability of Concrete

## PART 2 - PRODUCTS

### 2.1 CEMENTITIOUS CRYSTALLINE WATERPROOFING

A. Slurry Mixture: By volume, mix 5 parts powder to 3 parts water.

1. Portland Cement: ASTM C150, Type I.
2. Sand: Clean, sharp, well graded, ASTM C144.
3. Gravel: ASTM C33.
4. Water: Clean and potable.

B. Cementitious Crystalline Waterproofing shall have a VOC content no greater than 100 g/L.

C. Do not use in expansion joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Remove all laitance, dirt, films, paint, coatings or other foreign matter from surfaces to receive slurry mixture.

B. Lightly sandblast or waterblast smooth concrete joint surfaces.

C. Protect adjacent surfaces not to receive slurry from damage or discoloration.

### 3.2 APPLICATION

A. Apply in accordance with manufacturer’s written instructions and recommendations.

B. Thoroughly saturate prepared surfaces with clean water; remove excess water prior to application. Maintain in wet condition at time of application but without free water on surface.

C. Mix only amount to be applied in 20 minute period.

D. Evenly apply slurry in joints using with manufacturer’s recommended methods and equipment; apply in two coats if recommended. Fill joints to level with top of slab; smooth top to uniform finish with slab surface.

### 3.3 CLEANING AND PROTECTION

A. Remove temporary coverings and protections from adjacent work.

B. Clear area and properly dispose of debris.

C. Protect waterproofed joints from damage during construction.

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# SECTION 07 60 00
# FLASHING AND SHEET METAL

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Formed sheet metal work for flashing at reinstallation of existing wall louver and new roof opening and curb is specified in this section.

### 1.2 RELATED WORK

A. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

B. Integral flashing components of manufactured roof accessories or equipment: Division 22, PLUMBING sections and Division 23 HVAC sections.

C. Paint materials and application: Section 09 91 00, PAINTING.

### 1.3 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. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. ASTM International (ASTM):

A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B32-08.....Solder Metal

B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B370-09.....Copper Sheet and Strip for Building Construction

D412-06.....Vulcanized Rubber and Thermoplastic Elastomers-Tension

D1187-97(R2002).....Asphalt Base Emulsions for Use as Protective Coatings for Metal

D4586-07.....Asphalt Roof Cement, Asbestos Free

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

D. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

E. International Code Commission (ICC): International Building Code, Current Edition

**1.4 SUBMITTALS**

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

B. Shop Drawings: For all specified items, including:

1. Flashings

C. Manufacturer's Literature and Data: For all specified items, including:

1. Two-piece counterflashing.
2. Thru wall flashing.
3. Nonreinforced, elastomeric sheeting.

D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

**PART 2 - PRODUCTS**

**2.1 FLASHING AND SHEET METAL MATERIALS**

A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.

B. Aluminum Sheet: ASTM B209, alloy 3003-H14.

C. Nonreinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheeting shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30 degrees C (-20 degrees F).

**2.2 FLASHING ACCESSORIES**

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Bituminous Paint: ASTM D1187, Type I.

C. Fasteners:

1. Use stainless steel for stainless steel and aluminum alloy.
2. Nails:
   a. Minimum diameter for aluminum nails 3 mm (0.105 inch).
   b. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
   c. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.

3. Expansion Shields: Fed Spec A-A-1925A.

D. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

E. Roof Cement: ASTM D4586.

**2.3 SHEET METAL THICKNESS**

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):

1. Stainless steel: 0.25 mm (0.010 inch) thick.

C. Exposed Locations:

1. Stainless steel: 0.4 mm (0.015 inch).

D. Thickness of aluminum is specified with each item.

**2.4 FABRICATION, GENERAL**

A. Jointing:

1. In general, stainless steel , except expansion and contraction joints, shall be locked and soldered.
2. Jointing of stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
   b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Edges of nonreinforced elastomeric sheeting shall be jointed by lapping not less than 100 mm (4 inches) in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.
6. Soldering:
   a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1-1/2 inches) of stainless steel.
   b. Wire brush to produce a bright surface before soldering lead coated copper.
   c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.

d. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for stainless steel at intervals not exceeding 7200 mm (24 feet).
4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

**2.5 FINISHES**

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.

B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.

C. Finish exposed metal surfaces as follows, unless specified otherwise:

2. Stainless Steel: Finish No. 2B or 2D.
3. Aluminum: Mill finish.

**2.6 THROUGH-WALL FLASHINGS**

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.
   1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
   2. Fabricate so keying nests at overlaps.

B. For Masonry Work When Concealed Except for Drip:
   1. Either copper, stainless steel, or copper clad stainless steel.
   2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
   3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.

C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:
   1. Use same metal and thickness as counter flashing.
   2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
   3. Form exposed portion as snap lock receiver for counter flashing upper edge.

**2.7 BASE FLASHING**

A. Use metal base flashing at vertical surfaces intersecting roofing where shown.
   1. Use stainless steel, thickness specified unless specified otherwise.
   2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use 0.5 mm (0.018 inch) stainless steel.
   3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
   4. Use stainless steel at pipe flashings.

B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).

C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.

D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.

E. Pipe Flashing: (Other than engine exhaust or flue stack)

1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
   a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
   b. Allow for loose fit around and into the pipe.
4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
   a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
   b. Allow for loose fit around pipe.

**2.8 COUNTERFLASHING**

A. Either stainless steel, unless specified otherwise.

B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:

1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
3. Two-piece, lock in type flashing may be used in-lieu-of one piece counterflashing.
4. Manufactured assemblies may be used.
5. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:

1. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:
   1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
   2. Counterflashing upper edge designed to snap lock into receiver.
E. Surface Mounted Counterflashing; one or two piece:
   1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
   2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
   3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.
F. Pipe Counterflashing:
   1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
   2. Fabricate 100 mm (4 inch) over lap at end.
   3. Fabricate draw band of same metal as counter flashing. Use 0.33 mm (0.013 inch) thick stainless steel.
   4. Use stainless steel bolt on draw band tightening assembly.
   5. Vent pipe counterflashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Flashing and Reinstallation of Existing Wall Louver:
   1. Investigate and field-verify assumption that existing wall construction, where wall louver is being reinstalled, is cavity wall type construction with an air barrier. Notify the VA Resident Engineer and the Architect in writing describing the discovery of

found conditions prior to proceeding with work. The Resident Engineer will determine whether or not to modify Drawing details to suit actual wall construction.

**3.2 INSTALLATION**

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate.
5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
6. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
7. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
8. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
9. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
10. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
11. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.

12. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
13. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
    a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
    b. Paint dissimilar metal with a coat of bituminous paint.
    c. Apply an approved caulking material between aluminum and dissimilar metal.
14. Paint aluminum in contact with mortar, concrete, or other masonry materials with a coat of bituminous paint.
15. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
16. Bitumen Stops:
    a. Install bitumen stops for built-up roof opening penetrations through deck.

**3.3 THROUGH-WALL FLASHING**

A. General:
1. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
2. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
3. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
4. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
5. Terminate interior raised edge in masonry backup unit approximately 38 mm (1-1/2 inch) into unit unless shown otherwise.
6. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
7. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.

8. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
9. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
10. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
11. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
12. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.

B. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.

C. Flashing at Veneer Walls:
1. Install near line of finish floors over shelf angles or where shown.
2. Turn up against sheathing.
3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
4. At concrete backing, extend flashing into reglet as specified.
5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.

D. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

**3.4 BASE FLASHING**

A. Install where roof membrane type base flashing is not used and where shown.

1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

**3.5 COUNTERFLASHING**

A. General:

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:

1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.

2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
3. Where flashing is surface mounted on flat surfaces.
   a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
      1) Locate fasteners in masonry mortar joints.
      2) Use screws to sheet metal or wood.
   b. Fill joint at top with sealant.
4. Where flashing or hood is mounted on pipe.
   a. Secure with draw band tight against pipe.
   b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
   c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:
1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
   a. Secure to face construction in accordance, with manufacturers instructions.
   b. Completely fill space at the top edge of receiver with sealant.
3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.

D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

E. When counterflashing is a component of other flashing install as shown.

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# SECTION 07 81 00
# APPLIED FIREPROOFING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies mineral fiber and cementitious coverings to provide patching/repairing of existing fire resistance material on interior structural steel members shown.

### 1.2 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Manufacturer's complete and detailed application instructions and specifications.
2. Manufacturer's repair and patching instructions.

C. Certificates:

1. Certificate from testing laboratory attesting fireproofing material and application method meet the specified fire ratings.
   a. List thickness and density of material required to meet fire ratings.
   b. Accompanied by complete test report and test record.
2. Manufacturer's certificate indicating sprayed-on fireproofing material supplied under the Contract is same within manufacturing tolerance as fireproofing material tested.

D. Miscellaneous:

1. Manufacturer's written approval of surfaces to receive sprayed-on fireproofing.
2. Manufacturer's written approval of completed installation.
3. Manufacturer's written approval of the applicators of fireproofing material.

### 1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver to job-site in sealed containers marked and labeled to show manufacturer's name and brand and certification of compliance with the specified requirements.

B. Remove damaged containers from the site.

C. Store the materials off the ground, under cover, away from damp surfaces.

D. Keep dry until ready for use.

E. Remove materials that have been exposed to water before installation from the site.

**1.4 QUALITY CONTROL**

A. Test for fire endurance in accordance with ASTM E119, for fire rating specified, in a nationally recognized laboratory.

B. Manufacturer's inspection and approval of surfaces to receive fireproofing as specified under paragraph Examination.

C. Manufacturer's approval of fireproofing applications.

D. Manufacturer's approval of completed installation.

E. Manufacturer's representative shall observe and advise at the commencement of application, and shall visit the site as required thereafter for the purpose of ascertaining proper application.

F. Pre-Application Test Area.

1. Apply a test area consisting of a typical overhead fireproofing installation, including not less than 4.5 m (15 feet) of beam and deck.
   a. Apply to one column, if applicable.
   b. Apply for the hourly ratings used.
2. Install in location selected by the Resident Engineer, for approval by the representative of the fireproofing material manufacturer and by the Government.
3. Perform Bond test on painted steel in accordance with ASTM E736.
4. Do not proceed in other areas until installation of test area has been completed and approved.
5. Keep approved installation area open for observation as criteria for sprayed-on fireproofing.

**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 the basic designation only.

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

C841-03(R2008).....Installation of Interior Lathing and Furring
C847-10.....Metal Lath
E84-10.....Surface Burning Characteristics of Building Materials
E119-10.....Fire Tests of Building Construction and Materials

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

E736-00(R2006).....Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

E759-92(R2005).....The Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

E760-92(R2005).....Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

E761-92(R2005).....Compressive Strength of Fire-Resistive Material Applied to Structural Members

E859-93(R2006).....Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members

E937-93(R2005).....Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members

E1042-02(R2008).....Acoustically, Absorptive Materials Applied by Trowel or Spray.

G21-09.....Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory...Latest Edition including Supplements

D. Warnock Hersey (WH):
Certification Listings..Latest Edition

E. Factory Mutual System (FM):
Approval Guide.....Latest Edition including Supplements

**PART 2 - PRODUCTS**

**2.1 SPRAYED-ON FIREPROOFING**

A. ASTM E1042, Class (a), Category A.
   1. Type I, factory mixed cementitious materials with approved aggregate.
   2. Type II, factory mixed mineral fiber with integral inorganic binders minimum 240 kg/m$^3$ (15 1b/ft$^3$) density per ASTM E605 test unless specified otherwise. Use in areas that are completely encased.

B. Materials containing asbestos are not permitted.

C. Fireproofing characteristics when applied in the thickness and density required to achieve the fire-rating specified.

| | Characteristic | Test | Results |
|---|---|---|---|
| 1. | Deflection | ASTM E759 | No cracking, spalling, or delamination when backing to which it is applied has a deflection up to 1/120 in 3m (10 ft.) |
| 2. | Corrosion-Resistance | ASTM E937 | No promotion of corrosion of steel. |
| 3. | Bond Impact | ASTM E760 | No cracking, spalling, or delamination. |
| 4. | Cohesion/Adhesion (Bond Strength) | ASTM E736 | Minimum cohesive/adhesive strength of 9.57 kPa (200 $lbf/ft^2$) for protected areas. 19.15 kPa (400 $lbf/ft^2$) for exposed areas. |
| 5. | Air Erosion | ASTM E859 | Maximum gain weight of the collecting filter 0.27$gm/m^2$ (0.025 $gm/ft^2$). |
| 6. | Compressive Strength | ASTM E761 | Minimum compressive strength 48 kPa (1000psf). |
| 7. | Surface Burning Characteristics with adhesive and sealer to be used | ASTM E84 | Flame spread 25 or less smoke developed 50 or less |
| 8. | Fungi Resistance | ASTM G21 | Resistance to mold growth when inoculated with aspergillus niger (28 days for general application) |

**2.2 ADHESIVE**

A. Bonding adhesive for Type II (fibrous) materials as recommended and supplied by the fireproofing material manufacturer.

B. Adhesive may be an integral part of the material or applied separately to surface receiving fireproofing material.

**2.3 SEALER**

A. Sealer for Type II (fibrous) material as recommended and supplied by the fireproofing material manufacturer.

B. Surface burning characteristics as specified for fireproofing material.

C. Fungus resistant.

D. Sealer may be an integral part of the material or applied separately to the exposed surface. When applied separately use contrasting color pigmented sealer, white preferred.

**2.4 WATER**

A. Clean, fresh, and free from organic and mineral impurities.

B. pH of 6.9 to 7.1.

**2.5 MECHANICAL BOND MATERIAL**

A. Expanded Metal Lath: ASTM C847, minimum weight of 0.92 kg/$m^2$ (1.7 pounds per square yard).

B. Fasteners: ASTM C841.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Verify surfaces to receive fireproofing are clean and free of dust, soot, oil, grease, water soluble materials or any foreign substance which would prevent adhesion of the fireproofing material.

B. Verify hangers, inserts and clips are installed before the application of fireproofing material.

C. Verify ductwork, piping, and other obstructing material and equipment is not installed that will interfere with fireproofing installation.

D. Verify concrete work on steel decking and concrete encased steel is completed.

E. Verify temperature and enclosure conditions are required by fire-proofing material manufacturer.

**3.2 APPLICATION**

A. Do not start application until written approval has been obtained from manufacturer of fireproofing materials that surfaces have been inspected by the manufacturer or his representative, and are suitable to receive sprayed-on fireproofing.

B. Coordinate application of fireproofing material with other trades.

C. Application of Metal Lath (if required by manufacturer to meet code):

1. Apply to structural steel and connections disturbed by Work of this project.
2. Apply to underside of metal roof deck disturbed by Work of this project.
3. Apply to beam and columns having painted surfaces which fail ASTM E736 Bond Test requirements in pre-application test area.
4. Apply to beam flanges 300 mm (12-inches) or more in width.
5. Apply to column flanges 400 mm (16-inches) or more in width.
6. Apply to beam or column web 400 mm (16-inches) or more in depth.

7. Tack weld or mechanically fasten on maximum of 300 mm (12-inch) center.
8. Lap and tie lath member in accordance with ASTM C841.

D. Mix and apply in accordance with manufacturer's instructions.
1. Mechanically control material and water ratios.
2. Apply adhesive and sealer, when not an integral part of the materials, in accordance with the manufacturer's instructions.
3. Apply to density and thickness indicated in UL Fire Resistance Directory, FM Approval Guide, or WH Certification Listings unless specified otherwise. Test in accordance with ASTM E119.
4. Minimum applied dry density per cubic meter (cubic foot) shall be as follows:
a. Type I - 240 kg/m$^3$ (15 lb/ft$^3$); use in high traffic areas and in areas not covered by subsequent construction (steel structure exposed).
b. Type II - 350 kg/m$^3$ (22 lb/ft$^3$); use in areas covered by subsequent construction (steel structure enclosed in gypsum board partitions and above ceiling line).

E. Application shall be completed in one area, inspected and approved by Resident Engineer before removal of application equipment and proceeding with further work.

**3.3 FIELD TESTS**

A. Tests of applied material will be performed by VA retained Testing Laboratory. See Section 01 45 29, TESTING LABORATORY SERVICES.
B. Resident Engineer will select area to be tested in specific bays on each floor using a geometric grid pattern.
C. Test for thickness and density in accordance with ASTM E605. Areas showing thickness less than that required as a result of fire endurance test will be rejected.
D. Areas showing less than required fireproofing characteristics will be rejected on the following field tests.
1. Test for cohesion/adhesion: ASTM E736.
2. Test for bond impact strength: ASTM E760.

**3.4 PATCHING AND REPAIRING**

A. Inspect after mechanical, electrical and other trades have completed work in contact with fireproofing material, but before sprayed material is covered by subsequent construction.

B. Perform corrective measures in accordance with fireproofing material Manufacturer's recommendations.
   1. Respray areas requiring additional fireproofing material to provide the required thickness, and replace dislodged or removed material.
   2. Spray material for patching by machine directly on point to be patched, or into a container and then hand apply.
   3. Hand mixing of material is not permitted.
C. Repair:
   1. Respray all test and rejected areas.
   2. Patch fireproofing material which is removed or disturbed after approval.
D. Perform final inspection of sprayed areas after patching and repair.

**3.5 SCHEDULE**

A. Apply fireproofing material to interior structural steel members and on underside of interior steel roof decks, except on following surfaces:
   1. Areas used as air handling plenums.
   2. Steel to be encased in concrete or designated to receive other type of fireproofing.
B. Type I:
   1. One hour fire rating, unless otherwise indicated or required by code.
C. Type II:
   1. One hour fire rating, unless otherwise indicated or required by code.

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# SECTION 07 84 00
# FIRESTOPPING

## PART 1 GENERAL

### 1.1 DESCRIPTION

A. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.

B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

### 1.2 RELATED WORK

A. Expansion and seismic joint firestopping: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

B. Spray applied fireproofing: Section 07 81 00, APPLIED FIREPROOFING

C. Sealants and application: Section 07 92 00, JOINT SEALANTS.

D. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

### 1.3 SUBMITTALS

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

B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

C. List of FM, UL, or WH classification number of systems installed.

D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

### 1.4 DELIVERY AND STORAGE

A. Deliver materials in their original unopened containers with manufacturer’s name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

### 1.5 WARRANTY

Firestopping work subject to the terms of the Article “Warranty of Construction”, FAR clause 52.246-21, except extend the warranty period to five (5) years.

### 1.6 QUALITY ASSURANCE

FM, UL, or WH or other approved laboratory tested products will be acceptable.

**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):
E84-10.....Surface Burning Characteristics of Building Materials
E814-11.....Fire Tests of Through-Penetration Fire Stops

C. Factory Mutual Engineering and Research Corporation (FM):
Annual Issue Approval Guide Building Materials

D. Underwriters Laboratories, Inc. (UL):
Annual Issue Building Materials Directory
Annual Issue Fire Resistance Directory
1479-10.....Fire Tests of Through-Penetration Firestops

E. Warnock Hersey (WH):
Annual Issue Certification Listings

**PART 2 - PRODUCTS**

**2.1 FIRESTOP SYSTEMS**

A. Use either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 $m^2$ (16 sq. in.) in overall cross sectional area.

C. Products requiring heat activation to seal an opening by its intumescence shall exhibit a demonstrated ability to function as designed to maintain the fire barrier.

D. Firestop sealants used for firestopping or smoke sealing shall have following properties:
1. Contain no flammable or toxic solvents.
2. Have no dangerous or flammable out gassing during the drying or curing of products.

3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:
1. Classified for use with the particular type of penetrating material used.
2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.

F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.

G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.

H. Materials to be asbestos free.

**2.2 SMOKE STOPPING IN SMOKE PARTITIONS**

A. Use silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.

B. Use mineral fiber filler and bond breaker behind sealant.

C. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with E84.

D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

Submit product data and installation instructions, as required by article, submittals, after an on site examination of areas to receive firestopping.

**3.2 PREPARATION**

A. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.

B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

**3.3 INSTALLATION**

A. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.

B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

C. Install smoke stopping seals in smoke partitions.

**3.4 CLEAN-UP AND ACCEPTANCE OF WORK**

A. As work on each floor is completed, remove materials, litter, and debris.

B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.

C. Clean up spills of liquid type materials.

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# SECTION 07 92 00
# JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

### 1.2 RELATED WORK

A. Masonry control and expansion joint: Section 04 20 00, UNIT MASONRY.

B. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.

C. Glazing: Section 08 80 00, GLAZING.

D. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.

E. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION; Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING; and Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

### 1.3 QUALITY CONTROL

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI’s Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer’s recommendations:
   1. Locate test joints where indicated or, if not indicated, as directed by Contracting Officer.
   2. Conduct field tests for each application indicated below:
      a. Each type of elastomeric sealant and joint substrate indicated.
      b. Each type of non-elastomeric sealant and joint substrate indicated.
   3. Notify Resident Engineer seven (7) days in advance of dates and times when test joints will be erected.

E. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
   1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this section.

**1.4 SUBMITTALS**

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

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color where required to match adjacent material.

D. Manufacturer's Literature and Data:
   1. Caulking compound, each type.
   2. Primers, bonding agents, cleaners.
   3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
   4. Joint backing and filler, each type.

**1.5 PROJECT CONDITIONS**

A. Environmental Limitations:
   1. Do not proceed with installation of joint sealants under following conditions:

a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).

b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

**1.6 DELIVERY, HANDLING, AND STORAGE**

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

**1.7 DEFINITIONS**

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Back-up Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

**1.8 WARRANTY**

A. Warrant sealants and caulking against failure and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two (2) years.

B. Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

**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 Society for Testing and Materials (ASTM):

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.

C612-10.....Mineral Fiber Block and Board Thermal Insulation.

C717-10.....Standard Terminology of Building Seals and Sealants.

C834-10.....Latex Sealants.

C919-08.....Use of Sealants in Acoustical Applications.

C920-10.....Elastomeric Joint Sealants.

C1021-08.....Laboratories Engaged in Testing of Building Sealants.

C1193-13.....Standard Guide for Use of Joint Sealants.

C1311-10.....Solvent Release Sealants.

C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-09.....Surface Burning Characteristics of Building Materials.

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

**PART 2 - PRODUCTS**

**2.1 SEALANTS**

A. S-1:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-3:
   1. ASTM C920, polyurethane or polysulfide.
   2. Type S.
   3. Class 25, joint movement range of plus or minus 50 percent.
   4. Grade NS.
   5. Shore A hardness of 15-25.
   6. Minimum elongation of 700 percent.
D. S-4:
   1. ASTM C920 polyurethane or polysulfide.
   2. Type S.
   3. Class 25.
   4. Grade NS.
   5. Shore A hardness of 25-40.
E. S-6:
   1. ASTM C920, silicone, neutral cure.
   2. Type S.
   3. Class: Joint movement range of plus 100 percent to minus 50 percent.
   4. Grade NS.
   5. Shore A hardness of 15-20.
   6. Minimum elongation of 1200 percent.
F. S-7:
   1. ASTM C920, silicone, neutral cure.
   2. Type S.
   3. Class 25.
   4. Grade NS.
   5. Shore A hardness of 25-30.
   6. Structural glazing application.
G. S-8:
   1. ASTM C920, silicone, acetoxy cure.
   2. Type S.
   3. Class 25.
   4. Grade NS.
   5. Shore A hardness of 25-30.
   6. Structural glazing application.
H. S-9:
   1. ASTM C920 silicone.
   2. Type S.

3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

I. S-9A: *Special Interior Areas - Joints* TO BE EPOXY PAINTED or NOT TO BE PAINTED
1. ASTM C920 silicone.
2. Type S.
3. Class 50.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, no bacterial growth, mold and mildew resistant, USDA Approved.

J. S-11:
1. ASTM C920 polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

K. S-12:
1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

**2.2 CAULKING COMPOUND**

A. C-1: ASTM C834, acrylic latex.

B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

C. C-3: ASTM C1311, butyl rubber.

D. When used in exposed areas provide a product capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

**2.3 COLOR**

A. Sealants used with exposed masonry shall match color of mortar joints.

B. Sealants used with unpainted concrete shall match color of adjacent concrete.

C. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.

D. Caulking shall be light gray or white, unless specified otherwise.

**2.4 JOINT SEALANT BACKING**

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C, closed-cell material with a surface skin. Backing size and density sufficient to control sealant depth and contribute to producing optimum sealant performance.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

E. Back-up Rod: Type A, joint fillers; closed cell neoprene, butyl, polyurethane, vinyl or polyethylene rod; diameter approximately 1-1/3 times the joint width.

**2.5 FILLER**

A. Mineral Fiber: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

**2.6 PRIMER**

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

**2.7 NON-POUROUS SURFACES CLEANERS**

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

**3.2 PREPARATIONS**

A. Prepare joints in accordance with manufacturer's instructions and SWRI.

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.

2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

a. Concrete.

b. Masonry.

c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

a. Metal.

b. Glass.

c. Porcelain enamel.

d. Glazed surfaces of ceramic tile.

C. Do not cut or damage joint edges.

D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.

1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints.

F. Take all necessary steps to prevent three sided adhesion of sealants.

**3.3 BACKING INSTALLATION**

A. Install mineral fiber filler and bond breaker back-up material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.

D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

F. Take all necessary steps to prevent three sided adhesion of sealants.

**3.4 SEALANT DEPTHS AND GEOMETRY**

A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.

B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

**3.5 INSTALLATION**

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.

3. Do not use sealant type listed by manufacturer as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool joints to concave surface unless shown or specified otherwise.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
   1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
   2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
   3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
   4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
   5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

**3.6 FIELD QUALITY CONTROL**

A. Inspect for uniform joint widths and that dimensions are within tolerances established by sealant manufacturer.

B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

C. Inspect tested joints and report on following:

1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
2. Compare these results to determine if adhesion passes sealant manufacturer’s field-adhesion hand-pull test criteria.
3. Whether sealants filled joint cavities and are free from voids.
4. Whether sealant dimensions and configurations comply with specified requirements.

D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Ensure that original sealant surfaces are clean and new sealant contacts original sealant. Retest failed applications until test results prove sealants comply with indicated requirements.

G. Make necessary modifications for compliance with applicable criteria. Accomplish all necessary field settings, adjustments and modifications to comply with the project intent. Demonstrate results compared to acceptable values.

**3.7 CLEANING**

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.

B. After filling and finishing joints, remove masking tape.

C. Leave adjacent surfaces in a clean and unstained condition.

**3.8 LOCATIONS**

A. Exterior Building Joints, Horizontal and Vertical:
   1. Metal to Metal: Type S-1, S-2
   2. Metal to Masonry or Stone: Type S-1
   3. Masonry to Masonry or Stone: Type S-1
   4. Threshold Setting Bed: Type S-1, S-3, S-4
   5. Masonry Expansion and Control Joints: Type S-6

B. Metal Flashings:
   1. Metal to Metal: Type S-6

C. Sanitary Joints, unless otherwise indicated:
   1. Walls to Plumbing Fixtures: Type S-9
   2. Countertops to Walls: Type S-9
   3. Pipe Penetrations: Type S-9

D. Horizontal Traffic Joints:
   1. Use Type S-11, Shore A hardness of between 35 and 50 for minimal movement joints.
   2. Use Type S-12, Shore A hardness of between 25 and 30 for joints requiring of greater movement range of plus or minus 50 percent.
   3. Use Type S-3, Shore A hardness between 15 and 25, for joints not in direct traffic patterns, such as adjacent to walls or columns, where greater movement is expected.

E. High Temperature Joints over 204 degrees C (400 degrees F):
   1. Exhaust Pipes, Flues, Breech Stacks: Type S-7 or S-8

F. Interior Caulking:
   1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1, C-2, and C-3.
   2. Perimeter of Doors, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1, C-2 and C-3.
   3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1, C-2 and C-3.
   4. Perimeter of Gypsum Wallboard Walls: Types C-1, C-2 and C-3.
   5. Exposed Isolation Joints at Top of Full Height Walls: Types C-1, C-2 and C-3.
   6. Exposed Acoustical Joint at Sound Rated Partitions Type C-2.
   7. Concealed Acoustic Sealant Types S-4, C-1, C-2 and C-3.

**3.9 LOCATIONS OF SPECIAL INTERIOR AREAS - JOINTS**

A. Use S-9A: Interior joints - Special Areas **TO BE EPOXY PAINTED** (sealant applied on top of epoxy); All crevices, spaces, gaps and openings, including but not limited to the following, to ensure sealing of any space that will promote vermin or bacterial growth, to provide for pressurization of spaces, and to maintain acoustic separation.

1. Joints around door/window frames.
2. Wall/wall joints (dissimilar materials).
3. Wall joints.
4. Wall/deck joints where walls extend above ceilings to the structure above.
5. Wall and ceiling penetrations.
6. Wall corner guards.
7. Wall guard support brackets.
8. Ceiling/wall joints (hard ceilings).
9. Ceiling/diffuser and grill joints (hard ceilings).
10. Ceiling/light fixture joints (hard ceilings).
11. Electrical or plumbing fixtures or devices.
12. Electrical switch and receptacle cover plates.
13. Electrical and control device backboxes at all conduit and wire openings.
14. Electrical panels.
15. Door kick/armor plates.
16. Door glazing stops.
17. Water fountains.
18. Exposed water pipe support brackets.
19. Control joints.
20. NOTE:
    a. Install all fixtures and cover plates in full bead of sealant unless device is gasketed. Do not seal fixtures and cover plates after installation.
    b. Tool excess sealant to a neat and continuous finish, free of bubbles, pinholes, cracks.
    c. Apply a finish bead of sealant around devices where required to provide a smooth sealed surface finish between the device and the adjacent finish surface.
21. Refer to graphic indication on Drawings for applicable areas.

B. Use S-9A: Interior joints – All crevices, spaces, gaps and openings (other than control joints) **NOT TO BE PAINTED**, located in or adjacent to unpainted materials or surfaces in special areas noted below:

1. Fixtures and receptacles of similar material.
2. Casework.
3. Unpainted FRP door kick and armor panels.
4. Factory finished or factory painted surfaces.
5. Wall and ceiling penetrations.
6. NOTE:
   a. Install all fixtures and cover plates in full bead of sealant unless device is gasketed. Do not seal fixtures and cover plates after installation.
   b. Tool excess sealant to a neat and continuous finish, free of bubbles, pinholes, cracks.
   c. Apply a finish bead of sealant around devices where required to provide a smooth sealed surface finish between the device and the adjacent finish surface.
7. Refer to graphic indication on Drawings for applicable areas.

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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. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.

B. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

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

D. Glazing: Section 08 80 00, GLAZING.

### 1.3 TESTING

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. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements. Submit proof of temperature rating.
2. Sound rated doors, including test report from Testing Laboratory.

### 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):
128-09.....Acoustical Performance for Steel Door and Frame Assemblies

D. American National Standard Institute:
A250.8-2003 (R2008).....Specifications for Standard Steel Doors and Frames

E. American Society for Testing and Materials (ASTM):
A568/568-M-11.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled
A1008-10.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability
D1621-10.....Compressive Properties of Rigid Cellular Plastics
E90-09.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

F. The National Association Architectural Metal Manufactures (NAAMM):
Metal Finishes Manual (AMP 500-06)

G. National Fire Protection Association (NFPA):
80-13.....Fire Doors and Fire Windows

H. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory

I. Intertek Testing Services (ITS):
Certifications Listings…Latest Edition

J. 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. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

**2.2 METAL DOORS**

A. General:

1. Follow ANSI 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 ANSI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
2. Close top edge of exterior doors flush and seal to prevent water intrusion.
3. Use vertical steel stiffeners for core construction, fill spaces between stiffeners with mineral fiber insulation.

B. Heavy Duty Doors: ANSI A250.8, Level 2, Full flush seamless design of size and design shown. Core construction of vertical steel stiffeners for interior doors.

D. Fire Rated Doors (Labeled):

1. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Intertek Testing Services, or Factory Mutual for the class of door or door opening shown.
2. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.
3. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
4. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 degrees C (450 degrees F) above ambient temperature at end of 30 minutes of fire exposure when tested in accordance with ASTM E152.

**2.3 METAL FRAMES**

A. General:

1. ANSI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
2. Frames for Labeled Fire Rated Doors and Observation Windows.

a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Intertek Testing Services, or Factory Mutual.
b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.

3. Frames for doors specified to have automatic door operators: Minimum 1.7 mm (0.067 inch) thick.
4. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:
1. ANSI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Provide mortar guards securely fastened to back of hardware reinforcements.

C. Glazed Openings:
1. Integral stop on corridor or secure side of door.
2. Design rabbet width and depth to receive glazing material shown or specified.

D. Frame Anchors:
1. Floor Anchors:
a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts. Use 50 mm x 50 mm (2 inch by 2 inch) 9 mm by (3/8 inch) clip angle for lead lined frames, drilled for 9 mm (3/8 inch) floor bolts.
c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.
d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (24 inches) on center.
2. Jamb Anchors:
a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for

fire rated frames space anchors as required by labeling authority.

b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.

c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:
   1) Wire loop type of 5 mm (3/16 inch) diameter wire.
   2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.

d. 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.

e. Anchors for frames set in prepared openings:
   1) Steel pipe spacers with 6 mm (1/4 inch) inside diameter welded to plate reinforcing at jamb stops or hat shaped formed strap spacers, 50 mm (2 inches) wide, welded to jamb near stop.
   2) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass thru frame and spacers.

f. Anchors for observation windows and other continuous frames set in stud partitions.
   1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
   2) Anchors spaced 600 mm (24 inches) on centers maximum.

g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

**2.4 SHOP PAINTING**

ANSI A250.8.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. 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.

B. Floor Anchors:
1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:
1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

D. Install anchors for labeled fire rated doors to provide rating as required.

**3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE**

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

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# SECTION 08 31 13
# ACCESS DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies access doors or panels.

### 1.2 RELATED WORK

A. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

B. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.

C. Locations of access doors for duct work cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

### 1.3 SUBMITTALS

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

B. Shop Drawings: Access doors, each type, showing construction, location and installation details.

C. Manufacturer's Literature and Data: Access doors, each type.

### 1.4 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):

A167-99(R-2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-10.....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy

C. American Welding Society (AWS):

D1.3-08.....Structural Welding Code Sheet Steel

D. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Windows

E. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

F. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

**PART 2 - PRODUCTS**

**2.1 FABRICATION, GENERAL**

A. Fabricate components to be straight, square, flat and in same plane where required.
   1. Slightly round exposed edges and without burrs, snags and sharp edges.
   2. Exposed welds continuous and ground smooth.
   3. Weld in accordance with AWS D1.3.

B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.

C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

D. Doors/panels located in fire rated partitions shall have the same rating as partition.

**2.2 ACCESS DOORS, FIRE RATED**

A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120 degree C (250 degrees F).

B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.

C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel or stainless steel sheet as required, insulated sandwich type construction.

D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.
   1. Weld exposed joints in flange and grind smooth.
   2. Provide frame flange at perimeter where installed in masonry or gypsum board.

E. Automatic Closing Device: Provide automatic closing device for door.

F. Hinge: Continuous steel hinge with stainless steel pin.

G. Lock:
   1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.

2. Provide latch release device operable from inside of door. Mortise case in door.

**2.3 ACCESS DOORS, FLUSH PANEL**

A. Door Panel:
   1. Form of 1.9 mm (0.0747 inch) thick steel or 1.5 mm (0.0598 inch) thick stainless steel sheet as specified.
   2. Reinforce to maintain flat surface.

B. Frame:
   1. Form of 1.5 mm (0.0598 inch) thick steel or stainless steel sheet of depth and configuration to suit material and type of construction where installed.
   2. Provide surface mounted units having frame flange at perimeter where installed in masonry or gypsum board construction.
   3. Weld exposed joints in flange and grind smooth.

C. Hinge:
   1. Concealed spring hinge to allow panel to open 175 degrees.
   2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:
   1. Flush, screwdriver operated cam lock.

**2.4 FINISH**

A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.

B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

C. Stainless Steel: No. 4 for exposed surfaces.

**2.5 SIZE**

Minimum 600 mm (24 inches) square door unless otherwise shown or required to suit opening in suspension system of ceiling.

**PART 3 - EXECUTION**

**3.1 LOCATION**

A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition, or are above ceiling of gypsum board.

B. Use fire rated doors in fire rated partitions and ceilings.

C. Use flush panels in partitions and gypsum board or plaster ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

D. Use stainless steel access doors or panels in wet areas or in ceramic tile. Use painted steel access doors or panels elsewhere.

**3.2 INSTALLATION, GENERAL**

A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.

B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.

C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.

**3.3 ANCHORAGE**

A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.

B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.

C. Anchors for fire rated access doors shall meet requirements of applicable fire test.

**3.4 ADJUSTMENT**

A. Adjust hardware so that door panel will open freely.

B. Adjust door when closed so door panel is centered in the frame.

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# SECTION 08 33 13
# COILING COUNTER DOORS

## PART 1 -GENERAL

### 1.1 DESCRIPTION

A. Section specifies overhead roll up coiling shutters over counter in walls, including frame and counter.

B. Electrical and crank up operation.

### 1.2 RELATED WORK

A. Section 08 71 00, DOOR HARDWARE: Lock cylinder and keying.

B. Section 09 91 00, PAINTING: Field Painting.

C. Divisions 26 and 28: Electrical connections.

### 1.3 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Shutter, each type.
2. Installation procedures and instructions.

C. Shop Drawings:

1. Shutter, each type, showing details of construction and installation.

### 1.4 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):

A47-99(R2009).....Malleable Iron Castings
A48-03(R2008).....Gray Iron Castings
A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
A653-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs

C. American Welding Society (AWS):

D1.1-10.....Structural Welding Code Steel

D1.2-08.....Structural Welding Code Aluminum

D1.3-08.....Structural Welding Code Sheet Steel

D. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series-2006.....Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):

2605-11.....Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels

F. Federal Specifications (Fed. Spec):

TT-P-645B.....Primer, Paint, Zinc-Molybdates, Alkyd Type

G. NEMA-250 0 Enclosures for Electrical Equipment (1000 Volts Maximum).

H. NEMA-MG-1 – Motors and Generators.

G. National Fire Protection Association (NFPA):

80-10.....Fire Doors and Fire Windows

**1.5 DELIVERY, STORAGE AND HANDLING**

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

**1.6 PROJECT CONDITIONS**

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**1.7 COORDINATION**

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

**1.8 WARRANTY**

A. Manufacturer’s Warranty: Provide manufacturer’s two year limited warranty.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Aluminum:

1. Extruded: ASTM B221, alloy 6063-T5.
2. Sheet: ASTM B209.

B. Stainless Steel: ASTM A167, Type 304.

C. Galvanized Repair Compound: Mil. Spec MIL-P-21035.

D. Primer: Fed. Spec. TT-P-645.

E. Galvanized Steel: ASTM A653.

F. Steel Pipe: ASTM A53.

G. Casting: ASTM A47 or A48.

**2.2 FABRICATION**

A. Weld in accordance with AWS applicable code.

B. Fire Rated Shutter:

1. Integral counter, shutter, and frame type unit for installation with hood and fascia, related accessories and components, and automation closing by fusible link.
2. Comply with NFPA 80. The counter shall have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class A opening as shown.
3. Construct for flush surface mounted installation.
4. Construct of stainless steel on exposed to view components except counter.
5. Counter: Plastic laminated fire rated countertop. Provide shape shown on drawings and to integrate with door type. No aprons or additional pieces shall be allowed. Core: firestop composite and high density particleboard. Finish; top, bottom and all edges shall be covered with plastic laminate. Color as selected by Architect.
6. Curtain:
   a. Interlocking slats, Type F-158 fabricated of 22 gauge stainless steel, approximately 32 mm (1 1/4-inches) wide. Endlocks shall be attached to ends of alternate slats to maintain curtain alignment and prevent lateral slat movement.
   b. Bottom bar equipped with recessed flush handles, key operated cylinder lock and a continuous flexible seal to make contact

with counter. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.

7. Hood and Fascia: Galvanized painted steel, formed with beads or flanges to prevent deflection. FM approved hood shall be equipped with thermally controlled, internal flame baffle. Provide with UL listed exterior brush smoke seal.
8. Frame: Frame jamb sections to include guide slots for curtain with receiver for bolts and locks and continuous closure angles.
9. Counterbalance Assembly:
   a. Spring barrel or shaft of steel pipe of sufficient strength to ensure deflection not exceeding 1 mm (0.03-inch) per 300 mm (1 foot) of span.
   b. Barrel or shaft house oil-tempered, helically wound steel spring, and rotate on grease-sealed ball or roller-bearing units.
   c. Spring adjustable from outside.
   d. Brackets not less than 3 mm (0.125-inch) thick steel designed to form end closure support for head.
10. Operation:
   a. Manual Push-up type for curtains less than 2130 mm (7-feet) wide. Crank operated for curtains over 2130 mm (7-feet) wide with automatic release when activated by fusible link.
   b. Equip shutter with an automatic closing device actuated by fusible link to release at 165 degrees F. located exposed below the ceiling on both sides of opening in accordance with NFPA No. 80.
   c. Equip shutter with fail-safe, time–delay door release device to control closure in an emergency situation.
   d. Electric Motor Operation: Provide electric operator as listed in the door UL file, for size as recommended by manufacturer to move door in either direction.
   e. Sensing Edge Protection:
      1) Electric sensing edge.
   f. Operator Controls:
      1) Key operation with NEMA 1 interior, NEMA 4 exterior, surface and flush mounted open, close, and stop controls.
      2) Controls for interior location.
      3) Controls surface mounted.

**2.3 FINISH**

A. Stainless Steel: Mechanical finish No. 4 in accordance with NAAMM AMP 500 and AMP 503.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Locate anchors and inserts for guides, brackets, supports, hardware, and other accessories and components accurately.

C. Securely attach guides to adjoining construction with not less than 10 mm (3/8-inch) diameter bolts, spaced near each end and not over 600 mm (24 inches) apart.

1. Use fasteners conforming to ASTM F468 and F593.
2. Use stainless steel bolts with aluminum or stainless steal.
3. Use toggle bolts to frame walls or hollow masonry.
4. Use expansion bolts in solid masonry or concrete.

**3.2 REPAIR**

Repair damaged zinc-coated surfaces by applying galvanized repair compound in accordance with the manufacturer's directions.

**3.3 PROTECTION**

A. Isolate aluminum in contact with or fastened to dissimilar metal other than stainless steel, white bronze or other metals compatible with aluminum by painting the dissimilar or aluminum with a coat of TT-P-645 primer, or by placing an approved caulking compound, or a non-absorptive tape, or gasket between the aluminum and dissimilar metal.

B. Paint aluminum in contact with masonry or concrete with a coat of TT-P-645.

**3.4 ADJUSTING AND CLEANING**

A. Lubricate properly, adjust and demonstrate, to operate freely and as specified.

B. Clean upon completion.

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# SECTION 08 41 13
# ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies interior aluminum entrance work including storefront construction, hung doors, sliding doors, sidelights, and other components to make a complete assembly.

### 1.2 RELATED WORK

A. Glass and Glazing: Section 08 80 00, GLAZING.

B. Hardware: Section 08 71 00, DOOR HARDWARE.

C. Automatic Door Operators: Section 08 71 13, AUTOMATIC DOOR OPERATORS.

### 1.3 SUBMITTALS

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

B. Shop Drawings: (1/2 full scale) showing construction, anchorage, reinforcement, and installation details.

C. Manufacturer’s Literature and Data:

1. Doors, each type.
2. Entrance and Storefront construction.

D. Samples:

1. Door corner section, 450 mm x 450 mm (18 x 18 inches), of each door type specified, door closer reinforcement, internal reinforcement, and insulation; include sliding door mechanisms.
2. Two samples of anodized aluminum of each color showing finish and maximum shade range.

E. Manufacturer's Certificates:

1. Stating that aluminum has been given specified thickness of anodizing.
2. Indicating manufacturer's qualifications specified.

### 1.4 QUALITY ASSURANCE

A. Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.

B. Certify manufacturer regularly and presently manufactures aluminum entrances and storefronts as one of their principal products.

**1.5 DELIVERY, STORAGE AND HANDLING**

A. Deliver aluminum entrance and storefront material to the site in packages or containers; labeled for identification with the manufacturer's name, brand and contents.

B. Store aluminum entrance and storefront material in weather-tight and dry storage facility.

C. Protect from damage from handling, weather and construction operations before, during and after installation.

**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):

B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

E283-04.....Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

F468-10.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs

C. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

D. American Welding Society (AWS):

D1.2-08.....Structural Welding Code Aluminum

**1.7 PERFORMANCE REQUIREMENTS**

A. Shapes and thickness of framing members shall be sufficient to withstand a design wind load of not less than 1.4 kPa (30 pounds psf) of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65 (applied to overall load failure of the unit). Provide glazing beads, moldings, and trim of not less than 1.25 mm (0.050 inch) nominal thickness.

B. Air Infiltration: When tested in accordance with ASTM E283, air infiltration shall not exceed 2.63 x 10-50 cm per square meter (0.06

cubic feet per minute psf) of fixed area at a test pressure of 0.30 kPa (6.24 pounds psf) 80 kilometers (50 mile) per hour wind.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Aluminum, ASTM B209 and B221:
   1. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights, and storefronts.
   2. Alloy 6061 temper T6 for guide tracks for sliding doors and other extruded structural members.
   3. For color anodized finish, use aluminum alloy as required to produce specified color.

B. Thermal Break: Manufacturer’s standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.

C. Fasteners:
   1. Aluminum: ASTM F468, Alloy 2024.
   2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.

**2.2 FABRICATION**

A. Fabricate doors, of extruded aluminum sections not less than 3 mm (0.125 inch) thick. Fabricate glazing beads of aluminum not less than 1.0 mm (0.050 inch) thick.

B. Accurately form metal parts and accurately fit and rigidly assemble joints, except those joints designed to accommodate movement. Seal joints to prevent leakage of both air and water.

C. Make welds in aluminum in accordance with the recommended practice AWA D1.2. Use electrodes and methods recommended by the manufacturers of the metals and alloys being welded. Make welds behind finished surfaces so as to cause no distortion or discoloration of the exposed side. Clean welded joints of welding flux and dress exposed and contact surfaces.

D. Make provisions in doors and frames to receive the specified hardware and accessories. Coordinate schedule and template for hardware specified under Section 08 71 00, DOOR HARDWARE. Where concealed closers or other mechanisms are required, provide the necessary space, cutouts, and reinforcement for secure fastening.

E. Fit and assemble the work at the manufacturer's plant. Mark work that cannot be permanently plant-assembled to assure proper assembly in the field.

**2.3 PROTECTION OF ALUMINUM**

A. Isolate aluminum from contact with dissimilar metals other than stainless steel, white bronze, or zinc by any of the following:
   1. Coat the dissimilar metal with two coats of heavy-bodied alkali resistant bituminous paint.
   2. Place caulking compound, or non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
   3. Paint aluminum in contact with mortar, concrete and plaster, with a coat of aluminum paint primer.

**2.4 FRAMES**

A. Fabricate doors, frames, mullions, frames for fixed glass and similar members from extruded aluminum not less than 3 mm (0.125 inch) thick.

B. Provide integral stops and glass rebates and applied snap-on type trim.

C. Use concealed screws, bolts and other fasteners. Secure cover boxes to frames in back of all lock strike cutouts.

D. Fabricate framework with thermal breaks in frames where insulating glass is scheduled and specified under Section 08 80 00, GLAZING.

**2.5 STILE AND RAIL DOORS**

A. Nominal 45 mm (1-3/4 inch) thick, with stile and head rail 90 mm (3-1/2 inches) wide, and bottom rail 250 mm (10 inches) wide.

B. Bevel single-acting doors 3 mm (1/8 inch) at lock, hinge and meeting stile edges. Provide clearances of 2 mm (1/16 inch) at hinge stiles, 3 mm (1/8 inch) at lock stiles and top rails, and 5 mm (3/16 inch) at floors and thresholds. Form glass rebates integrally with stiles and rails. Glazing beads may be formed integrally with stiles and rails or applied type secured with fasteners at 150 mm (6 inches) on centers.

C. Construct doors with a system of welded joints or interlocking dovetail joints between stiles and rails. Clamp door together through top and bottom rails with 9 mm (3/8 inch) primed steel rod extending into the stiles, and having a self-locking nut and washer at each end. Reinforce stiles and rails to prevent door distortion when tie rods are tightened. Provide a compensating spring-type washer under each nut to take up any stresses that may develop. Construct joints between rails and stiles to remain rigid and tight when door is operated.

D. Weather-stripping: Provide removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder. Make slots for applying weather-stripping integral with doors and door frame stops. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames. Install weather-stripping so doors can swing or slide freely and close positively.

**2.6 REINFORCEMENT FOR BUILDERS HARDWARE**

A. Fabricate from stainless steel plates.

B. Hinge and pivot reinforcing: 4.55 mm (0.1793 inch) thick.

C. Reinforcing for lock face, flush bolts, concealed holders, concealed or surface mounted closers: 2.66 mm (0.1046 inch) thick.

D. Reinforcing for all other surface mounted hardware: 1.5 mm (0.0598 inch) thick.

**2.7 FINISH**

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

1. Clear Finish: Chemically etched medium matte, with clear anodic coating, Class I Architectural, 7 mils thick.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Allowable Installation Tolerances: Install work plumb and true, in alignment and in relation to lines and grades shown. Variation of 3 mm (1/8 inch) in 2400 mm (8 feet), non-accumulative, is maximum permissible for plumb, level, warp, bow and alignment.

B. Anchor aluminum frames to adjoining construction at heads, jambs and bottom and to steel supports, and bracing. Anchor frames with stainless steel or aluminum countersunk flathead, expansion bolts or machine screws, as applicable. Use aluminum clips for internal connections of adjoining frame sections.

C. Where work is installed within masonry or concrete openings, place no parts other than built-in anchors and provision for operating devices located in the floor, until after the masonry or concrete work is completed.

D. Install hardware specified under Section 08 71 00, DOOR HARDWARE.

E. Install hung and sliding door operators specified under Section 08 71 13, AUTOMATIC DOOR OPERATORS.

**3.2 ADJUSTING**

After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to ensure proper performance.

**3.3 PROTECTION, CLEANING AND REPAIRING**

Remove all mastic smears and other unsightly marks, and repair any damaged or disfiguration of the work. Protect the installed work against damage or abuse.

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# SECTION 08 56 19
# PASS WINDOWS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies sliding glass counter mounted pass windows.

### 1.2 RELATED WORK

A. Pass window opening: Section 08 33 13, COILING COUNTER DOORS.

B. Glass and Glazing: Section 08 80 00, GLAZING.

### 1.3 APPLICABLE PUBLICATIONS

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

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

B221/221M-08.....Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Shapes and Tubes (Metric)

C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material

C. American Society of Mechanical Engineers (ASME):

B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

D. Master Painters Institute (MPI):

MPI #18.....Organic Zinc Rich Coating

E. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series.....Metal Finishes Manual

AMP 500.....Introduction to Metal Finishing

AMP 501.....Finishes for Aluminum

## PART 2 - PRODUCTS

### 2.1 MATERIAL

A. Aluminum Extrusions:

1. ASTM B221/B221M.
2. Alloy and temper recommended by window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 150 MPa (22,000 psi) ultimate tensile strength, and yield of 110 MPa (16,000 psi).
3. Aluminum alloy used for colored anodic coating as required to produce specified color.

B. Paint: MPI #18.

C. Glazing Gaskets: ASTM C509.

**2.2 SLIDING GLASS PASS WINDOWS, COUNTER MOUNTED**

A. Fabricate sliding glass sash and frames of extruded aluminum with corners mitered.

B. Fabricate sash to receive 6 mm (1/4 inch) thick glass.

C. Fabricate sliding sash of "H" channel molding at bottom edges including concealed nylon rollers at bottom set on track and guides at top set into track.

D. Provide sash with pin tumbler lock and two keys.

E. Provide sash with finger slot on vertical edge.

F. Fabricate frame with channel sash slot, bottom roller track, and top guides.

G. Sash may be factory or field glazed using glazing gaskets.

H. Use concealed screws in assembly.

I. Finish:

1. Comply with NAAMM AMP 500 Series.
2. Clear anodic coating, Class II Architectural 0.4 mills thick, AA-C22A41.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Install in pass window opening level and plumb.

B. Secure with screws to opening; ASME B18.6.4.

1. Screw within 100 mm (4 inches) of ends.
2. Space screws not over 600 mm (24 inches) between end screws.

C. Coat aluminum in contact with steel with one coat of MPI No. 18.

D. Clean unit of dust and markings.

**3.2 OPERATION**

A. Adjust to roll smoothly and stay in position where stopped.

B. Demonstrate to Resident Engineer operation and locking.

C. Turn keys with key tags over to Resident Engineers.

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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. Section 07 92 00 JOINT SEALANTS: Caulking.

B. Section 08 14 00, INTERIOR WOOD DOORS; Section 08 11 13, COILING COUNTER DOORS Section 08 33 13, HOLLOW METAL DOORS AND FRAMES; Section 08 71 13, AUTOMATIC DOOR OPERATORS; Section 08 71 13.11 LOW ENERGY DOOR OPERATORS: Application of Hardware.

C. Section 09 91 00, PAINTING: Painting.

D. Division 26, ELECTRICAL: Electrical.

E. Section 28 31 00, FIRE DETECTION AND ALARM: Fire Detection.

### 1.3 GENERAL

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

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. 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.

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

1. Mortise locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.
4. Exit devices.

5. Floor closers.

**1.4 WARRANTY**

A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two (2) years in lieu of one (1) year for all items except as noted below:
   1. Locks, latchsets, and panic hardware: Five (5) years.
   2. Door closers and continuous hinges: Ten (10) years.

**1.5 MAINTENANCE MANUALS**

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article INSTRUCTIONS, furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

**1.6 SUBMITTALS**

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit six (6) copies of the schedule per Section 01 33 23. Submit two (2) final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

| 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: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. 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: 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 (4) years of submittal of reports for approval.

**1.7 DELIVERY AND MARKING**

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Resident Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Resident Engineer's 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.

**1.8 PREINSTALLATION MEETING**

A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer’s Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.
6. Installation.
7. Adjusting.
8. Repair.
9. Field quality control.
10. Cleaning.

**1.9 INSTRUCTIONS**

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols.

Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.

B. Keying: All cylinders shall be keyed into existing Best Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the Resident Engineer.

**1.10 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

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

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

A156.1-06.....Butts and Hinges

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

A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts

A156.4-08.....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

A156.12-05 .....Interconnected Locks and Latches

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

A156.14-07 .....Sliding and Folding Door Hardware

A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical

A156.16-08.....Auxiliary Hardware

A156.17-04 .....Self-Closing Hinges and Pivots

A156.18-06.....Materials and Finishes

A156.20-06 .....Strap and Tee Hinges, and Hasps
A156.21-09.....Thresholds
A156.22-05.....Door Gasketing and Edge Seal Systems
A156.23-04.....Electromagnetic Locks
A156.24-03.....Delayed Egress Locking Systems
A156.25-07 .....Electrified Locking Devices
A156.26-06.....Continuous Hinges
A156.28-07 .....Master Keying Systems
A156.29-07 .....Exit Locks and Alarms
A156.30-03 .....High Security Cylinders
A156.31-07 .....Electric Strikes and Frame Mounted Actuators
A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):
80-10.....Fire Doors and Fire Windows
101-09.....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):
Building Materials Directory (2008)

**PART 2 - PRODUCTS**

**2.1 BUTT HINGES**

A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g. some types of swing-clear hinges). The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
   1. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc., shall be of stainless steel material.

B. Provide quantity and size of hinges per door leaf as follows:
   1. Doors up to 1210 mm (4 feet) high: 2 hinges.
   2. Doors 1210 mm (4 feet) to 2260 mm (7’-5”) high: 3 hinges minimum.
   3. Doors greater than 2260 mm (7’-5”) high: 4 hinges.
   4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.

5. Doors over 900 mm (3 feet) to 1065 mm (3’-6”) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
6. Doors over 1065 mm (3’-6”) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
7. Provide heavy-weight hinges where specified.
8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

**2.2 CONTINUOUS HINGES**

A. ANSI/BHMA A156.26, Grade 1-600.
   1. Listed under Category N in BHMA's "Certified Product Directory."

B. General: Minimum 0.120-inch (3.0-mm) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete

C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35 mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
   1. Base Metal for Interior Hinges: Stainless steel.
   2. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel.
   3. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
   4. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
   5. Provide with manufacturer’s cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.
   6. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
   7. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer’s adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

**2.3 DOOR CLOSING DEVICES**

A. Closing devices shall be products of one manufacturer for each type specified.

**2.4 OVERHEAD CLOSERS**

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

B. Closers shall conform to the following:

1. The closer shall have minimum 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: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.

12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 38 mm (1-1/2 inch) minimum piston diameter.

**2.5 FLOOR CLOSERS AND FLOOR PIVOT SETS**

A. Comply with ANSI A156.4. Provide stainless steel floor plates for floor closers and floor pivots, except where metal thresholds occur. Provide cement case for all floor closers. Floor closers specified for fire doors shall comply with Underwriters Laboratories, Inc., requirements for concealed type floor closers for classes of fire doors indicated on drawings. Hold-open mechanism, where required, shall engage when door is opened 105 degrees, except when door swing is limited by building construction or equipment, the hold-open feature shall engage when door is opened approximately 90 degrees. The hold-open mechanism shall be selectable on/off by turning a screw through the floor plate. Floor closers shall have adjustable hydraulic back-check, adjustable close speed, and adjustable latch speed. Provide closers with delayed action where a hold-open mechanism is not required. Floor closers shall be multi-sized. Single acting floor closers shall also have built in dead stop. Where required, provide closers with special cement cases appropriate for shallow deck installation or where concrete joint lines run through the floor blockout. At offset-hung doors installed in deep reveals, provide special closer arm and spindle to allow for installation. Where stone or terrazzo is applied over the floor closer case, provide closer without floor plate and with extended spindle (length as required) and special cover pan (depth as required) to allow closer to be accessed without damaging the material applied over the closer. Pivots for non-labeled doors shall be cast, forged or extruded brass or bronze.

B. Where floor closer appears in hardware set provide the following as applicable.
   1. Double Acting Floor Closers: Type C06012.
   2. Single Acting Floor Closer: Type C06021 (center pivoted). (Intermediate pivot is not required).
   3. Single Acting Floor Closers: Type C06041 (offset pivoted).

4. Single Acting Floor Closer for Labeled Fire Doors: Type C06051 (offset pivoted).
5. Single Acting Floor Closers For Lead Lined Doors: Type C06071 (offset pivoted).

**2.6 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. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

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. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.

E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.

F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76 mm (3-inch) core-drilled hole and filled with quick-setting cement.

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

H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

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

J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.

K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.

L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

**2.7 OVERHEAD DOOR STOPS AND 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. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

**2.8 FLOOR DOOR HOLDERS**

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

**2.9 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. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer’s fire label. Provide temporary keying device or construction core of allow opening and closing during construction and prior to the installation of final cores.

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. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design matching facility standard. No substitute lever material shall be accepted.

All locks and latchsets shall be furnished with 122.55 mm (4-7/8 inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Lock function F02 shall be furnished with emergency tools/keys for emergency entrance. All lock cases installed on lead lined doors shall be lead lined before applying final hardware finish. Furnish armored fronts for all mortise locks. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.

2. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locks and latchsets shall be furnished with 122.55 mm (4-7/8 inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21 mm (7/8-inch) lip-to-center dimension. Provide lever design to match design selected by Architect or to match existing lever design. Where two turn pieces are specified for lock F76, turn piece on inside knob shall lock and unlock inside knob, and turn piece on outside knob shall unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)
3. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.5.

**2.10 ELECTRIC STRIKES**

A. ANSI/ BHMA A156.31 Grade 1.

B. General: Use fail-secure electric strikes at fire-rated doors.

**2.11 KEYS**

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

| **Locks/Keys** | **Quantity** |
|---|---|
| Cylinder locks | 2 keys each |
| Cylinder lock change key blanks | 100 each different key way |
| Master-keyed sets | 6 keys each |
| Grand Master sets | 6 keys each |

| | |
|---|---|
| Great Grand Master set | 5 keys |
| Control key | 2 keys |

**2.12 KEY CABINET**

A. ANSI Standard A156.5. Provide key cabinet made of cold rolled, 1.2 mm (0.0478-inch) thick furniture steel electro-welded. Doors shall have "no sag" continuous brass-pin piano type hinge and be equipped with chrome plated locking door handles, hook cam and mechanical pushbutton door lock. Key Cabinet and Key Control System shall accommodate all keys for this project plus 25 percent. Provide minimum number of multiple cabinets where a single cabinet of largest size will not accommodate the required number of keys.

B. Key tags shall consist of two sets: Permanent self-locking and loan key snaphook type with tag colors as follows: Red fiber marker of the permanent self-locking type approximately 32 mm (1-1/4 inch) in diameter engraved with the legend "FILE KEY MUST NOT BE LOANED". Also furnish for each hook a white cloverleaf key marker with snap-hooks engraved with the legend "LOAN KEY".

C. The manufacturer of the lock cylinders and locks shall attach a key tag to keys of each lock cylinder and shall mark thereon the respective item number and key change number. Provide each group of keys in a key gathering envelope (supplied by Key Cabinet Manufacturer) in which the lock manufacturer shall include the following information: Item number, key change number and door number. The contractor shall furnish the Key Cabinet Manufacturer the hardware and keying schedules and change keys.

D. The Key Cabinet Manufacturer shall set up a three-way cross index system, including master keys, listing the keys alphabetically, the hooks numerically and the key changes numerically on different colored index cards. Index cards shall be typewritten and inserted in a durable binder. Attach the keys to the two sets of numbered tags supplied with the cabinet. (The permanent tag and the loan key tag). Instruct the Owner in proper use of the system. Install cabinet as directed by the Resident Engineer.

**2.13 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING**

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick plates, mop plates and armor plates of metal, Type J100 series.
2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick plates and/or mop plates are not required on following door sides:
   a. Armor plate side of doors;
   b. Exterior side of exterior doors;
   c. Closet side of closet doors;
   d. Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.
5. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick plate in place of armor plate. Size of stretcher plate and kick plate shall be 254 mm (10 inches) high.
6. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-

height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

**2.14 EXIT DEVICES**

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.

C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.

D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.

E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

**2.15 FLUSH BOLTS (LEVER EXTENSION)**

A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.

B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.

C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

**2.16 FLUSH BOLTS (AUTOMATIC)**

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

**2.17 DOOR PULLS WITH PLATES**

A. Conform to ANSI A156.6. Pull Type J401, 152 mm (6 inches) high by 19 mm (3/4 inches) diameter with plate Type J302, 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Provide pull with projection of 70 mm (2 3/4 inches) and a clearance of 51 mm (2 inches). Cut plates of door pull plate for cylinders, or turn pieces where required.

**2.18 PUSH PLATES**

A. Conform to ANSI A156.6. Metal, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide metal Type J302 plates 100 mm (4 inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

**2.19 COMBINATION PUSH AND PULL PLATES**

A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

**2.20 COORDINATORS**

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of

doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

**2.21 THRESHOLDS**

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 ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. For thresholds at elevators entrances see other sections of specifications.

C. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) from fame face.

**2.22 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS**

A. Conform to ANSI A156.22. Provide mortise or under-door type, except where not practical. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

**2.23 WEATHERSTRIPS (FOR EXTERIOR DOORS)**

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774$m^3$/s/m).

**2.24 MISCELLANEOUS HARDWARE**

A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E76213, conforming to ANSI A156.5. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Cylinders for Various Partitions and Doors: Key cylinders same as entrance doors of area in which partitions and door occur, except as

otherwise specified. Provide cylinders to operate locking devices where specified for following partitions and doors:

1. Folding doors and partitions.
2. Wicket door (in roll-up door assemblies).
3. Slide-up doors.
4. Swing-up doors.
5. Fire-rated access doors-Engineer's key set.
6. Doors from corridor to electromagnetic shielded room.
7. Day gate on vault door.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

**2.25 PADLOCKS FOR VARIOUS DOORS, GATES AND HATCHES**

A. ASTM E883, size 50 mm (2 inch) wide chain; furnish extended shackles as required by job conditions. Provide padlocks, with key cylinders, for each door in following areas as noted.

B. Key padlocks as follows:

1. Chain Link Fence Gates for Oxygen Storage Buildings: Maintenance supply set.

C. Omit padlocks on communicating refrigerator doors.

**2.26 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. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --interior doors: 652 or 630.
2. Pivots: Match door trim.

3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
4. Thresholds: Mill finish aluminum.
5. Cover plates for floor hinges and pivots: 630.
6. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Special Finish: Exposed surfaces of hardware for dark bronze anodized aluminum doors shall have oxidized oil rubbed bronze finish (dark bronze) finish on door closers shall closely match doors.

F. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

**2.27 BASE METALS**

A. Apply specified U.S. Standard finishes on different base metals as following:

| **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 VA Resident Engineer for approval.

B. Hardware Heights from Finished Floor:
1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).

4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. 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 on side of door inside rooms, inside stairs, and away from corridors - except bathroom and anteroom doors which shall have closer installed parallel arm on exterior side of doors. 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. 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) |
| 35 mm (1-3/8 inch) (hollow core wood doors) | Not over 1200 mm (4 feet) | 113 mm (4-1/2 inches) |

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. 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.

E. Hinges Required Per Door:

| | |
|---|---|
| Doors 1500 mm (5 feet) or less in height | 2 butts |
| Doors over 1500 mm (5 feet) high and not over 2280 mm (7’-6”) high | 3 butts |
| Doors over 2280 mm (7’-6”) high | 4 butts |
| Dutch type doors | 4 butts |
| Doors with spring hinges 1370 mm (4’-6”) high or less | 2 butts |
| Doors with spring hinges over 1370 mm (4’-6”) | 3 butts |

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. 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 FINAL INSPECTION**

A. Installer to provide letter to VA Resident/Project Engineer that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

**3.4 DEMONSTRATION**

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Resident/Project Engineer and VA Locksmith.

**3.5 HARDWARE SETS**

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.

ELECTRIC HARDWARE ABBREVIATIONS LEGEND:
ADO = Automatic Door Operator
EMCH = Electro-Mechanical Closer-Holder
MHO = Magnetic Hold-Open (wall- or floor-mounted)

**GENERAL NOTE: REFER TO SECURITY DRAWINGS FOR DOORS REQUIRING DOOR STATUS SWITCHES.**

**INTERIOR SINGLE DOORS**

HW-1

Each Door to Have: NON-RATED

| | | |
|---|---|---|
| Hinges | | QUANTITY & TYPE AS REQUIRED |
| 1 | Door Pull w/ Plate | J401 x J302 |
| 1 | Push Plate | J302 |
| 1 | Kick Plate | J102 |
| 1 | Mop Plate (@ Inswing Doors) | J103 |
| 1 | Closer | C02011/C02021 |
| 1 | Wall Stop | L02101 CONVEX |
| 3 | Silencers | L03011 |

HW-1A

| Each Door to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| | | X HOSPITAL TIPS @ INSWING DOORS |
| 1 | Latchset | F01 |
| 1 | Closer | C02011/C02021 |
| | | x INSTALL OUTSIDE ROOM |
| 1 | Kick Plate | J102 |
| 1 | Mop Plate (@ Inswing Doors) | J103 |
| 1 | Wall Stop | L02101 CONVEX |
| 1 | Overhead Stop, at column | C01541-ADJUSTABLE |
| 1 | Set Seals | R0E154 |

HW-1Q

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 1 | Latchset | F01 |
| 1 | Kick Plate | J102 |
| 1 | Closer | C02011/C02021 |
| 1 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 1 | Overhead Stop | C01541-ADJUSTABLE |
| 1 | Threshold | J32300 x 57 MM WIDTH (2-1/4 INCHES) |
| 1 | Auto Door Bottom | R3C325 – HEAVY DUTY |
| 2 | Sets Self-Adhesive Seals | R0E154 |

HW-1R

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 1 | Latchset | F01 |
| 1 | Kick Plate | J102 |
| 1 | Closer | C02011/C02021 |
| 1 | Wall Stop | L02101 CONVEX |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-1S

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 1 | Latchset | F01 |
| 1 | Kick Plate | J102 |
| 1 | Closer | C02011/C02021 |
| 1 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 1 | Overhead Stop | C01541-ADJUSTABLE |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-1T

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 1 | Latchset | F01 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Closer | C02011/C02021 |
| 1 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 1 | Overhead Stop | C01541-ADJUSTABLE |
| 1 | Threshold | J32300 x 57 MM WIDTH (2-1/4 INCHES) |
| 1 | Auto Door Bottom | R3C325 – HEAVY DUTY |
| 2 | Sets Self-Adhesive Seals | R0E154 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS.

HW-2

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Keyed Privacy Indicator Lock | F13 x OCCUPANCY INDICATOR |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 |
| 1 | Mop Plate (@ Inswing Doors) | J103 |
| 1 | Overhead Stop | C01541-ADJUSTABLE |
| 1 | Set Self-Adhesive Seals | R0E154 |

STONE THRESHOLD BY OTHER TRADES.

HW-2D

| Each Door to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Privacy Lock | F02-MOD X OCCUPANCY INDICATOR |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 |
| 1 | Mop Plate (@ Inswing Doors) | J103 |
| 1 | Wall Stop | L02101 CONVEX |
| 1 | Set Self-Adhesive Seals | R0E154 |

STONE THRESHOLD BY OTHER TRADES.

HW-3

| Each Door to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Office Lock | F04 |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 |
| 1 | Floor Stop | L02121 x 3 FASTENERS |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-3E

| Each Door to Have: | | NON-RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Office Lock | F04 |
| 1 | Floor Stop | L02121 x 3 FASTENERS |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 1 | Coat Hook | L03121 |

OMIT COAT HOOK WHERE GLASS LITE PREVENTS INSTALLATION.

HW-4D

| Each Door to Have: | | RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 1 | Classroom Lock | F08 |
| 1 | Closer | C02011/C02021 |
| 1 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 1 | Mop Plate (@ Inswing Doors) | J103 |
| 1 | Overhead Stop | C01541-ADJUSTABLE |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-4L

| Each Door to Have: | | NON-RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Classroom Lock | F08 |
| 1 | Kick Plate | J102 |
| 1 | Floor Stop | L02121 x 3 FASTENERS |
| 1 | Auto Door Bottom | R3C325 – HEAVY DUTY |
| 1 | Set Sound/Light Seals | R3E264 |

HW-5

| Each Door to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Storeroom Lock | F07 |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 (@ STORAGE, EVM, & HAC ROOMS ONLY) |
| 1 | Wall Stop | L02101 CONVEX |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-5A

| Each Door to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Storeroom Lock | F07 |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 (@ STORAGE, EVM, & HAC ROOMS ONLY) |
| 1 | Overhead Stop, surface | CO5541 |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-5F

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS |
| 1 | Storeroom Lock | F07 |
| 1 | Closer (@ Rated Doors) | C02011/C02021 |
| 1 | Heavy-Duty Armor Plate | J101 x 3.175 MM (0.125 INCH) THICKNESS |
| 1 | Wall Stop | L02101 CONVEX |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-5M

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS x EPT Prep |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Kick Plate | J102 |
| 1 | Door Bottom | R3A434 x NYLON BRUSH INSERT |
| 1 | Set Self-Adhesive Seals | R0E154 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

HW-5N

Each Door to Have: RATED/NON-RATED

| | | |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Kick Plate | J102 |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 1 | Auto Door Bottom | R3C325 - HEAVY DUTY |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS.

HW-6

Each Door to Have: RATED

| | | |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Exit Device | TYPE 1 F14 LEVER |
| 1 | Closer | C02011/C02021 |
| 1 | Overhead Stop | C01541-ADUSTABLE |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-8B

Each Pair to Have: NON-RATED

| | | |
|---|---|---|
| 2 | Continuous Hinge | |
| 2 | Push Plate | J304 8″ x 16″ |
| 2 | Hospital Grip | J401 |
| 4 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 2 | Closer | C02011/C02021 |
| 2 | Overhead Stop, surface | CO5541 |
| 2 | Silencers | L03011 |

HW-8F

| Each [ADO] Pair to Have: | | NON-RATED |
|---|---|---|
| 2 | Continuous Hinges | x INTEGRAL HINGE GUARD CHANNEL |
| | | X ADJUSTA-SCREWS |
| 2 | Push Plate | J304 8″ x 16″ |
| 4 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 2 | Silencers | L03011 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS . POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).

HW-10A

| Each [ADO] Pair to Have: | | NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS x EPT Prep<br>TRANSFER X IN-HINGE ACCESS PANEL |
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| 1 | Electric Power Transfer | 10 Wire,Misc Accessory GVUX |
| 1 | Set Auto Flush Bolts | TYPE 25 LESS BOTTOM BOLT |
| 1 | Classroom Lock | F08 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Coordinator | TYPE 21A |
| 1 | Overlapping Astragal with Self-Adhesive Seal | R0Y634 x R0Y154 x THRU-BOLTS |
| 2 | Armor Plates | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 2 | Edge Guard (@ Wood Doors) | J208M / J211 (VERIFY), CUT: HARDWARE |
| 2 | Floor Stops | L02121 x 3 FASTENERS |
| 1 | Threshold | J32300 x width as required for opening |
| 2 | Auto Door Bottoms | R3C335 – HEAVY DUTY |
| 2 | Set Self-Adhesive Seals | R0E154 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

POWER TRANSFER **SHARED BY ELECTRIC STRIKE AND** RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).

HW-10G

| Each Pair to Have: | | NON-RATED |
|---|---|---|
| 2 | Continuous Hinges | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS |
| 1 | Set Auto Flush Bolts | TYPE 25 LESS BOTTOM BOLT |
| 1 | Dust Proof Strike | L14011 |
| 1 | Coordinator, bar type | 21A |
| 1 | Classroom Lock | F08 |
| 1 | Overlapping Astragal with Self-Adhesive Seal | R0Y634 x R0Y154 x THRU-BOLTS |
| 2 | Heavy-Duty Armor Plates | J101 x 3.175 MM (0.125 INCH) THICKNESS |
| 1 | Lock Trim Protector Bar | R111LPB-630 (ROCKWOOD), OR EQUAL |
| 1 | Threshold | J32300 x WIDTH AS REQUIRED FOR OPENING |
| 2 | Auto Door Bottom | R3C335 – HEAVY DUTY |
| 2 | Sets Self-Adhesive Seals | R0E154 |

INSTALL LOCK TRIM PROTECTOR BAR ON PUSH SIDE OF ACTIVE LEAF TO PROTECT LEVER TRIM.

HW-11

| Each Pair to Have: | | RATED/NON-RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Set Auto Flush Bolts | TYPE 25 LESS BOTTOM BOLT |
| 1 | Storeroom Lock | F07 |
| 1 | Coordinator | TYPE 21A |
| 1 | Overlapping Astragal with Self-Adhesive Seal | R0Y634 x R0Y154 x THRU-BOLTS |
| 2 | Closers | C02011/C02021 |
| 2 | Kick Plates | J102 (@ STORAGE ROOMS ONLY) |
| 2 | Floor Stops | L02121 x 3 FASTENERS |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-12

| Each Pair to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Exit Device | TYPE 7 or 8 F01 |
| 1 | Exit Device | TYPE 7 or 8 F08 LEVER |
| 1 | Key Cylinder | TYPE AS REQUIRED |
| 1 | Set Meeting Stile Astragals | R3J735 |
| 2 | Closers | C02011/C02021 |
| 2 | Floor Stops | L02121 x 3 FASTENERS |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-12B

| Each [ADO] Pair Doors to Have: | | RATED |
|---|---|---|
| 2 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS |
| 2 | Exit Device | TYPE 7 or 8 F3 x less bottom rod |
| 2 | Cylinders | |
| 2 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, FAIL SECURE, mount in head to operate RH device top rod |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Set Meeting Stile Astragals | R3J735 |
| 2 | Kick Plates | J102 |
| 2 | Edge Guard | J208M / J211 (VERIFY), CUT: HARDWARE |
| 2 | Door Bottom | R3A434 x NYLON BRUSH INSERT |
| 2 | Set Self-Adhesive Seals | R0E154 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

HW-12D

| Each [ADO] Pair Double Egress Doors to Have: | | RATED |
|---|---|---|
| 2 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS |
| 2 | Exit Device | TYPE 7 or 8 F14 x less bottom rod |
| 2 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, FAIL SECURE, mount in head to operate RH device top rod |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Set Meeting Stile Astragals | R3J735 |
| 4 | Kick Plates | J102 |
| 2 | Edge Guard | J208M / J211 (VERIFY), CUT: HARDWARE |
| 2 | Door Bottom | R3A434 x NYLON BRUSH INSERT |
| 2 | Set Self-Adhesive Seals | R0E154 |

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

HW-12L

| Each Pair to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 2 | Exit Device | TYPE 7 or 8 F14 |
| 1 | Set Meeting Stile Astragals | R3J735 |
| 2 | Closers | C02011/C02021 |
| 2 | Electromagnetic Holders,wall type | LCN SEM 7850 |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-12M

| Each Pair to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 2 | Exit Device | TYPE 7 or 8 F14 |
| 1 | Set Meeting Stile Astragals | R3J735 |
| 2 | Closers | C02011/C02021 |
| 2 | Wall Stop | L02101 CONVEX |
| 4 | Kick Plate | J102 |
| 1 | Set Self-Adhesive Seals | R0E154 |

HW-13

| Each Coiling Counter Doors: | | RATED/NON-RATED |
|---|---|---|
| 1 | Cylinder, type as required by Counter Door Assembly | |

ALL OTHER HARDWARE BY SECTION 08 33 13. COORDINATE LOCKING REQUIREMENTS AND PROVIDE TYPE OF CYLINDER OR PADLOCK AS REQUIRED.

HW-SH-3

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Closer | C02011/C02021 |
| 1 | Kick Plate | J102 |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 1 | Alarm Contact | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28.

HW-SH-3D

| Each Door to Have: | RATED/NON-RATED |
|---|---|
| 1 Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | X ADJUSTA-SCREWS |
| 1 Storeroom Lock | F07 |
| 1 Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 Closer | C02011/C02021 |
| 1 Overhead Stop | C01541-ADJUSTABLE |
| 1 Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 1 Set Self-Adhesive Seals | R0E154 |
| 1 Alarm Contact | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28.

HW-SH-3F

| Each AC, RR, EL, REX, DPS Door to Have: | RATED |
|---|---|
| 1 Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL |
| | X ADJUSTA-SCREWS |
| 1 Storeroom Lock | F07 |
| 1 Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 Closer | C02011/C02021 |
| 1 Kick Plate | J102 |
| 1 Wall Stop | L02101 CONVEX |
| 1 Set Self-Adhesive Seals | R0E154 |
| 1 Alarm Contact | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28.

HW-SH-3I

| Each Door to Have: | | RATED/NON-RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS x EPT Prep |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Power Supply | REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED |
| 1 | Kick Plate | J102 |
| 1 | Door Bottom | R3A434 x NYLON BRUSH INSERT |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 1 | Alarm Contact | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28.

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

HW-SH-9

| Each [AC, EL, REX, DPS] Pair to Have: | | RATED |
|---|---|---|
| | Hinges | QUANTITY & TYPE AS REQUIRED |
| 1 | Electric Power Transfer | 10 Wire,Misc Accessory GVUX |
| 1 | Set Auto Flush Bolts | TYPE 25 |
| 1 | Dust Proof Strike | L04021 |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Coordinator | TYPE 21A |
| 1 | Overlapping Astragal with Self-Adhesive Seal | R0E634 x R0Y154 x THRU-BOLTS |
| 2 | Closers | C02011/C02021 |
| 2 | Kick Plates | J102 (@ STORAGE ROOMS ONLY) |
| 2 | Floor Stops | L02121 x 3 FASTENERS |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 2 | Alarm Contacts | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28. COORDINATE ASTRAGAL WITH ELECTRIC STRIKE

HW-SH-9B

| Each [AC, EL, REX, DPS] Pair to Have: | | RATED |
|---|---|---|
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS X EPT Prep |
| 1 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS |
| 1 | Electric Power Transfer | 10 Wire,Misc Accessory GVUX |
| 1 | Set Auto Flush Bolts | TYPE 25 |
| 1 | Dust Proof Strike | L04021 |
| 1 | Storeroom Lock | F07 |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, |
| 1 | Coordinator | TYPE 21A |
| 1 | Overlapping Astragal with Self-Adhesive Seal | R0E634 x R0Y154 x THRU-BOLTS |
| 2 | Closers | C02011/C02021 |
| 2 | Overhead Stop | C01541-ADJUSTABLE |
| 2 | Heavy-Duty Armor Plates | J101 x 3.175 MM (0.125 INCH) THICKNESS |
| 1 | Lock Trim Protector Bar | R111LPB-630 (ROCKWOOD), OR EQUAL |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 2 | Alarm Contacts | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER BY DIVISION 28.

HW-SH-10A

| Each Pair Card Reader/Automatic Doors to Have: | | RATED |
|---|---|---|
| 2 | Continuous Hinge | x INTEGRAL HINGE GUARD CHANNEL<br>X ADJUSTA-SCREWS |
| 1 | Fire Rated Multi-Point Vertical Rod Lock @ RH door ANSI SIM TO 09(Sargent 12-NB-7046 x ET push side lever x no lever pull side x no bottom rod) | |
| 1 | Fire Rated Multi-Point Vertical Rod Lock @ LHR door ANSI SIM TO 09(Sargent 12-NB-7015 x ET push side lever x no lever pull side x no bottom rod) | |
| 1 | Key Cylinder | TYPE AS REQUIRED |
| 1 | Electric Strike | ANSI/BHMA GRADE 1, UL1034 & UL10C, US32D, FAIL SECURE, mount in head to operate RH device top rod |
| 1 | Power Supply | Provided through Access Control System |
| 4 | Armor Plate | J101 x 1.275 MM (0.050 INCH) THICKNESS |
| 2 | Edge Guard (@ Wood Doors) | J208M / J211 (VERIFY), CUT: HARDWARE |
| 1 | Set Self-Adhesive Seals | R0E154 |
| 1 | Set Astragal | By door supplier |
| 2 | Alarm Contact | |

120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

CARD READER AND OTHER ACCESSORIES BY DIVISION 28.

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.11, AUTOMATIC DOOR OPERATORS.

- - - E N D - - -

# SECTION 08 71 13
# AUTOMATIC DOOR OPERATORS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies equipment, controls and accessories for automatic operation of swing and sliding doors.

### 1.2 RELATED WORK

A. Door hardware; Section 08 71 00, DOOR HARDWARE.

B. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

C. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

D. Section 28 31 00, FIRE DETECTION AND ALARM.

### 1.3 QUALITY ASSURANCE

A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.

B. One type of automatic door equipment shall be used throughout the building.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

### 1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the Warranty period shall be two (2) years in lieu of one (1) year.

### 1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article INSTRUCTIONS, furnish maintenance manuals and instructions on automatic door operators.

### 1.6 SUBMITTALS

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

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:

1. Showing location of controls and safety devices in relationship to each automatically operated door.

2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to Resident Engineer that items listed in Article 1.3 are in compliance.

**1.7 DESIGN CRITERIA**

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in three seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

**1.8 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. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
101-09.....Life Safety Code

D. Underwriters Laboratory (UL):
325-10.....Door, Drapery, Gate, Louver, and Window Operators and Systems

**1.9 DELIVERY AND STORAGE**

A. Delivery shall be in factory’s original, unopened, undamaged container with identification labels attached.

**PART 2 - PRODUCTS**

**2.1 SWING DOOR OPERATORS**

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power, or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.

3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.

**2.2 MICROPRCESSOR CONTROLS**

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed:

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated in the architectural drawings.

**2.3 SLIDING DOOR OPERATORS**

A. General: Sliding doors shall have electric operators, conforming to BHMA A156.10 and the following requirements as applicable. Assembly shall be single or bi-parting sliding doors as shown on drawings.

B. Door Operation: Doors shall be opened by electric motor pulling door from closed to open position and shall stop door by electrically reducing voltage and stalling door against mechanical stop. System shall permit manual control of door in event of power failure. Opening and closing speeds shall be adjustable. In compliance with NFPA-101, all door panels shall allow "breakout" to the full open position to provide instant egress at any point in the door’s movement.

C. Operators: Completely assembled and sealed electromechanical operating unit, all located in cast aluminum housing and filled with special

lubricant for extreme conditions. Attached to transmission system shall be a minimum 1/8 Hp "DC" shunt-wound permanent magnet motor with sealed ball bearings. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement. Operators shall have adjustable opening and closing cycle. Housing shall be minimum 6063T-5 alloy aluminum not less than 0.005 mm (0.125 inch) minimum thickness, 150 mm by 200 mm (6 inch wide by 8 inch high).

D. Sliding Door Hardware Guide Rollers, Door Carrier: Top door carriers shall ride on steel or delrin rollers incorporating sealed bearings with each door having two support rollers and one anti-rise roller. Each roller shall have a minimum of 9 mm (3/8-inch) of vertical adjustment with positive mechanical locks. Each door shall also include two urethane covered oil impregnated bearing bottom rollers attached with 5 mm (3/16-inch) thick formed steel guide brackets. Each door carrier supporting a door leaf shall include a vertical steel reinforcing member to prevent sagging when door is swung under breakaway conditions. All carbon steel brackets and fittings shall be plated for corrosion resistance.

E. Locking Hardware: Do not provide any locking hardware at interior doors not requiring physical security. Provide doors with flush concealed vertical rod panic hardware integrated into the doors where physical security is required and free egress is required at all times. Provide doors with manufacturers’ standard hookbolt lock (keyed both sides) where physical security is required and free egress is not required at all times. At doors with access control devices (card readers, etc.) provide doors with electronic deadbolt locking to prevent the doors from manually sliding open.

F. Door Closers: Provide all breakout or swing-out panels with door closers concealed in the top rail of the door.

**2.4 POWER UNITS**

Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

**2.5 DOOR CONTROLS**

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall

cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (4 inch by 4 inch), with 13 mm (l/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Motion Detector: The motion detector may be surface mounted or concealed, to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm (5 feet) deep and 1500 mm (5 feet) across, plus or minus 150 mm (6 inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

**2.6 SAFETY DEVICES**

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.

B. At sliding doors, provide two photoelectric beams mounted at heights of 600 mm (24 inches) and 1200 mm (48 inches) in the door frame on sliding doors. Provide overhead safety presence sensors at door head on each side of the opening. Beams shall parallel door openings to prevent doors from closing when anyone is in the center of the door or doors. When beams are activated, doors shall recycle to full open position. Actuation shall include a motion detector mounted on each side of the door for detection of traffic in each direction.

C. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

D. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

E. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.

B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type o£ traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

**3.2 INSTRUCTIONS**

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 4 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.

B. Coordinate instruction to VA personnel with VA Resident Engineer.

- - - E N D - - -

# SECTION 08 71 13.11
# LOW ENERGY POWER ASSIST DOOR OPERATORS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies low energy power assisted automatic operation of swing doors. The door operator system shall be complete including operator, controls, door arm and operator enclosure (header and cover).

### 1.2 RELATED WORK

A. Section 07 92 00, JOINT SEALANTS: Sealants.

B. Section 08 11 13, HOLLOW METAL DOORS AND FRAMES: Steel doors.

C. Section 08 14 00, INTERIOR WOOD DOORS: Wood doors.

D. Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS: Aluminum frames entrance work.

E. Section 08 71 00, DOOR HARDWARE: Door hardware.

F. Section 08 71 13, AUTOMATIC DOOR OPERATORS.

G. Section 08 80 00, GLAZING: Glass and glazing of doors and frames.

H. Section 28 31 00, FIRE DETECTION AND ALARM: Smoke detectors for control of fire smoke doors to be wired.

I. Division 26, ELECTRICAL: Electric general wiring, connections and equipment requirements.

### 1.3 MANUFACTURER'S QUALIFICATIONS

A. Power assisted door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three (3) years.

B. One manufacturer of automatic door equipment shall be used throughout the project.

### 1.4 WARRANTY

Power assisted door operators, controls and other related equipment shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the warranty period shall be two (2) years in lieu of one (1) year.

### 1.5 MAINTENANCE MANUALS

In accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article INSTRUCTIONS, furnish three (3) copies of maintenance manuals and instructions on automatic door operators.

**1.6 SUBMITTALS**

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

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:
Showing location of controls and safety devices in relationship to each automatically operated door. This includes templates, wiring diagrams, fabrication details, anchorage and other information to providers of related work to coordinate the proper installation of the door operators.

**1.7 DESIGN CRITERIA**

A. Power assisted automatic door equipment shall accommodate normal traffic as well as the weight of the doors.

B. Equipment: UL approved and comply with applicable codes. Motors shall be rated minimum one-quarter horsepower and shall be single phase and 115 volts.

C. Electrical Wiring: Provide wiring so that only a single power supply is required. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

**1.8 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 National Standards Institute (ANSI):
ICC/ANSI A117.1-03.....Guideline for Accessible and Usable Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People

C. Builders Hardware Manufacturers Association, Inc. (BHMA):
156.19-07.....Power Assist and Low Energy Power Operated Doors

**PART 2 - PRODUCTS**

**2.1 OPERATORS**

A. Automatic door operators shall be for commercial doors and shall be electromechanical and surface mounted above the door to the header or transom bar. The opening force shall be generated by a permanent

magnet DC motor driving a combination spiral bevel/spur gear reducer and transmitted to the door through an arm linkage. Opening speed shall be adjustable and feature dual backcheck control allowing adjustment of backcheck speed and position. Closing shall be by spring force generated by a metal compression spring. The spring shall reduce manual opening force to not more than 67 N (15 lbf). The minimum diameter of spring wire shall be .007mm (172 in.). Under the specified design load of the door, the spring shall be capable of performing 2,000,000 cycles before fracture. Adjustable closing speed and fixed latch speed shall control the door in the closing cycle. The doors shall be operated manually at any time without damage to the operator or components.

B. All operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall recycle doors instantaneously to full open position from any point in closing cycle when control switch is reactivated.

C. Operator shall be swinging type enclosed in housing. Operator shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Swing Operator Housing: Housing shall be 140 mm (5-1/2 inches) wide by 150 mm (6 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inch) and larger frame systems. All structural sections shall have a minimum thickness of 3.7 mm (0.146 inch) and be fabricated of 6063-T5 aluminum alloy.
2. Swing Power Operator: Completely assembled and sealed unit which shall include helical gear drive transmission, mechanical spring and bearings, all located in cast aluminum case and filled with special lubricant for extreme temperature conditions. A "DC" shunt-wound permanent magnet motor with sealed ball bearings shall be attached to transmission system. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.

3. Connecting hardware for swing overhead concealed type power operator shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing and adjustable slide block, traveling in an interconnected track and top pivot assembly. Top track and pivot assembly shall be fabricated of steel. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. Relays shall be plug-in type for individual replacement and all connecting harnesses shall have interlocking plugs. Control shall also include time delay for normal cycle. Swing door control shall include safe-swing circuit with optional switching which automatically limits power and slows door when approached from the doors swing area.
5. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

**2.2 MICROPROCESSOR CONTROLS**

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1 – 30 sec.), LED indications for actual position unknown, system status, open obstruction shutdown, activation signal, safety mat/sensor signal, Stop-and-Hold signal, and mode selector switches providing a means for easy field selection of the following functions: push-to-operate, latch assist and stack pressure. Control shall be capable of receiving activation signals from any device with normally open dry contact output.
   1. With push-to-operate function enabled, the control shall provide a means of initiating a self-start activation circuit by slightly pushing the door open at any point in the door swing.
   2. Latch Assist shall provide a two second impulse in the close direction to overcome restrictions with locking devices of pressure differentials, allowing the unit to operate in standard time delay mode, and permitting the door to close from the full open position after the hold time is satisfied. All activation modes shall provide fully adjustable opening speed.

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit

that monitors door operation and shuts the motor off if an open obstruction is sensed. The control shall include a recycle feature the reopens the door if an obstruction is sensed at any point during its closing cycle. The control shall include a standard three position toggle switch with functions for ON, OFF, and HOLD OPEN.

**2.3 ENCLOSURE**

Operator shall be completely self-contained within an extruded aluminum housing (alloy 6063-T6) to conceal operator mechanism and mounting brackets and with removable access cover with an overall maximum size of 140 mm (5-1/2 inches) wide by 150 mm (6 inches) deep. Header color shall be integral color anodized/painted to match adjacent storefront/ frame finish.

**2.4 ACTIVATION DEVICES**

A. Automatic: Opening cycle shall be activated by pressing switches with international symbol of accessibility and "PRESS TO OPERATE DOOR" engraved on the faceplate. Switches shall be installed in a standard 2-gang electrical wall box and placed in a location in compliance with ANSI A117.1. Switches may be wall mounted or mounted on a freestanding post or guard rail.

B. Manual: Push-to-operate; manually pushing the door shall activate the automatic opening cycle. Door shall automatically close after timer delay expires.

C. Opening and closing force, measured 25 mm (1 inch) out from the lock stile of the door, shall not exceed 67 N (15 lbf) to stop the door when operating in either direction or cycle.

D. Opening Time: Doors shall be field adjusted so that opening time to back check or 80 degrees, whichever occurs first, shall be 3 seconds or longer as required in Table 1. Backcheck shall not occur before 60 degrees opening.

Total opening time to fully open shall be as in Table II.

E. Closing Time:

Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer as required in Table 1.

1. Doors shall be field adjusted to close from 10 degrees to fully close position in not less than 1.5 seconds.
2. Doors shall be field adjusted to remain fully open for not less than 5 seconds.

3. Table 1 provides speed settings for various widths and weights of doors for obtaining results complying with this paragraph.

F. Cycle Tests:

1. Low Energy Power Operated, Low Energy Power Open and Power Assist Operators shall be cycle tested for 300,000 cycles.
2. Use the widest and heaviest door specified as a test specimen. Narrower or lighter doors of the same configurations shall then be considered to meet the cycle test requirements.

**Table 1**

Minimum Opening Time to Backcheck or 80 degrees, which ever occurs first and the Minimum Closing Time from 90 degrees to Latch Check or 10 degrees.

| "D" Door Leaf Width- mm (inches) | "W" Door Weight in kg (pounds) Matrix Values are in seconds | | | | |
|---|---|---|---|---|---|
| | (100) 45.4 | (56.7) 125 | (68.0) 150 | (79.4) 175 | (90.7) 200 |
| (762) 30 | 3.0 | 3.0 | 3.0 | 3.0 | 3.5 |
| (914) 36 | 3.0 | 3.5 | 3.5 | 4.0 | 4.0 |
| (1067) 42 | 3.5 | 4.0 | 4.0 | 4.5 | 4.5 |

Doors of other weights and widths can be calculated using the formula;

T = DvW/133 in US units  T = DvW/2260 in SI (metric) units

Where: T= Time, seconds

D= Door width, mm (inches)

W= Door weight, kg (lbs)

The values for "T" time have been rounded up to the nearest half second. These values are based on a kinetic energy of (1.25 lbf-ft).

**Table II**

Total Opening Time to Full Open Position

| Backcheck at 60 degrees | Backcheck at 70 degrees | Backcheck at 80 degrees |
|---|---|---|
| Table 1 plus 2 seconds | Table 1 plus 1.5 seconds | Table 1 plus 1 second |

Note: To determine maximum times from close to full open, the operator shall be adjusted as shown in the chart. Backcheck occurring at a

point between positions in Table II shall use the lowest setting. For example, if the backcheck occurs at 75 degrees, the full open shall be the time shown in Table 1 plus 1.5 seconds.

**2.5 POWER UNITS**

Provide separate self-contained electric circuits for automatic operators located on each floor of the building. Interruption or failure of power circuits for operators located on one floor of the building shall not interfere with continuous performance of automatic operated doors located on other floors. Capacity and size of power circuits shall be in accordance with automatic operator manufacturer's specifications.

**2.6 SAFETY DEVICES**

A. Time delay switches shall be adjustable between 5 to 60 seconds and shall control closing cycle of doors.

B. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown and shall conform to the requirements of ANSI/BHMA A156.19.

C. Each swing door shall have installed a motion sensor to detect any person standing in the door swing path and prevent the door from opening.

D. Motion sensors shall consist of detection modules, factory prepared to be attached to each side of the lock/strike stile, an armored flex link power cable and bracket assembly, factory prepared for attachment to the pivot stile; a logic board and a position encoder which shall mount to the operator. The detection modules shall contain transmitting and receiving diodes and sense multidimensional zones for detection of people and/or objects in the door area. Detection modules shall be high impact, shock resistant zinc castings with tinted lenses. The swing door sensor system shall provide complete operate and safety zone coverage. These zones shall be fully adjusted to meet specific jobsite conditions (sidewalls, adjacent panels, etc.). The system shall not be affected by ultrasonic, ambient light or radios frequencies within the vicinity of the swing door.

E. Each swing door shall have installed a re-activation sensor mounted on the push-side door face near the top detect any person standing in the door swing path and prevent the door from closing. Wiring for the re-activation sensor between the door and frame shall be concealed in a

power transfer device, hinge or pivot provided under Section 08 71 00, DOOR HARDWARE; wire chase in door provided under door section.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment in finish work.

B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type o£ traffic (pedestrians) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer and Project Manager.

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# SECTION 08 80 00
# GLAZING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

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. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
   2. Mirrors: Section 10 28 00, TOILET AND BATH ACCESSORIES.

### 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.

### 1.4 PERFORMANCE REQUIREMENTS

A. Glass Thickness:
   1. Test in accordance with ASTM E 1300.
   2. Thicknesses listed are minimum. 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. Elastic compound for metal sash glazing.
   3. Putty, for wood sash glazing.
   4. Glazing cushion.
   5. Sealing compound.

D. Samples:
   1. Size: 150 mm by 150 mm (6 inches by 6 inches).

E. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer’s test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

**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.

**1.7 PROJECT CONDITIONS**

Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

**1.8 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):
   Z97.1-09.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

C. American Society for Testing and Materials (ASTM):
   C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants

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

C920-11.....Elastomeric Joint Sealants

C1036-06.....Flat Glass

C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

D635-10.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position

E84-10.....Surface Burning Characteristics of Building Materials

E119-10.....Standard Test Methods for Fire Test of Building Construction and Material

D. Code of Federal Regulations (CFR):
16 CFR 1201-2010 - Safety Standard for Architectural Glazing Materials; 2010

E. National Fenestration Rating Council (NFRC)

F. Safety Glazing Certification Council (SGCC) 2012:
Certified Products Directory (Issued Semi-Annually).

G. Glass Association of North America (GANA):
Glazing Manual (Latest Edition)
Sealant Manual (2009)

**PART 2 - PRODUCT**

**2.1 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).

**2.2 GLAZING ACCESSORIES**

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).

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, moisture, heat, cold, and aging.
2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.

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. 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.

G. Color:
1. Color of glazing compounds and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color.

## 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**

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.

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

A. Cut glazing tape and 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 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)**

A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.

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 tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

E. Fill gaps between pane and applied stop with appropriate type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

**3.6 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.

**3.7 PROTECTION**

Protect finished surfaces from damage during erection, and after completion of work.

**3.8 GLAZING SCHEDULE**

A. Tempered Glass:

1. Install in doors, adjacent sidelights, observation windows, and sliding reception transaction window as indicated.
2. Use clear tempered glass, unless otherwise indicated or specified.

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# SECTION 09 22 16
# NON-STRUCTURAL METAL FRAMING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies steel studs wall systems, ceiling or soffit suspended framing, fasteners, and accessories for the screw attachment of gypsum board or other building boards.

### 1.2 RELATED WORK

A. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.

B. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS and Section 09 29 00, GYPSUM BOARD.

### 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: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists.

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

### 1.4 SUBMITTALS

A. 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. Channels (Rolled steel).
3. Screws, clips and other fasteners.

C. Shop Drawings:

1. Typical ceiling suspension system.
2. Typical metal stud construction system including details around openings and corner details.
3. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. Test Results: Fire rating test designation, each fire rating required for each assembly.

### 1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

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/A123M-13.....Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

C11-10.....Terminology Relating to Gypsum and Related Building Materials and Systems

C635-07.....Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636-08.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-09.....Non-Structural Steel Framing Members

C754-11.....Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008).....Installation of Interior Lathing and Furring

C954-10.....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

C1002-07(2013).....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E580-11.....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**

Galvanize steel studs and runners (track) with coating designation of G-60 minimum, per ASTM A123.

**2.2 STEEL STUDS AND RUNNERS (TRACK)**

A. ASTM C645, modified for thickness specified and sizes as shown.

1. Use ASTM A525 steel, 0.8 mm (0.0329-inch) thick bare metal (33 mil).
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 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES**

A. ASTM C754, except as otherwise specified.

B. For fire rated construction: Type and size same as used in fire rating test.

C. 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.

D. 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.

E. Tie Wire and Hanger Wire:

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

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

**2.4 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)**

A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.

B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

**PART 3 - EXECUTION**

**3.1 INSTALLATION CRITERIA**

A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.

B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) 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 or specified.

B. Space studs not more than 610 mm (24 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.

E. 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 SUPPORTS REQUIRED BY OTHER TRADES**

A. Provide for attachment and support of electrical outlets, plumbing, heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, toilet stall partitions, chalkboards, wall-hung casework, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators 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.

**3.4 INSTALLING SUSPENDED CEILINGS OR SOFFITS**

A. Install suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for soffits.

1. Space framing at 400 mm (16-inch) centers for metal lath anchorage.
2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.

B. Concrete slabs on steel decking composite construction:

1. Use pull down tabs when available.
2. Use power activated fasteners when direct attachment to structural framing can not be accomplished.

C. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.

D. Existing concrete construction exposed or concrete on steel decking:

1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.

E. Steel decking without concrete topping:

1. Do not fasten to steel decking 0.76 mm (0.0299-inch) or thinner.

2. Toggle bolt to decking 0.9 mm (0.0359-inch) or thicker only where anchorage to steel framing is not possible.

F. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
1. Install only for ceilings to receive screw attached gypsum board.
2. Install in accordance with ASTM C636.
   a. Install main runners spaced 1200 mm (48 inches) on center.
   b. Install 1200 mm (48 inch) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
   c. Install wall track channel at perimeter.

G. Installing Ceiling Bracing System:
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 overhead 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).
C. Level or align ceilings within 3 mm (1/8-inch).

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# SECTION 09 29 00
# GYPSUM BOARD

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

### 1.2 RELATED WORK

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

B. Sound deadening board: Section 07 21 13, THERMAL INSULATION.

C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

### 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: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.

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

### 1.4 SUBMITTALS

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

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 assembly and column fireproofing, indicating details of construction same as that used in fire rating test.

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

E. Test Results:
   1. Fire rating test, each fire rating required for each assembly.

**1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE**

In accordance with the requirements of ASTM C840.

**1.6 ENVIRONMENTAL CONDITIONS**

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):

C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems

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

C840-08.....Application and Finishing of Gypsum Board

C919-08.....Sealants in Acoustical Applications

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

C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing

C1178-11.....Glass Mat Water-Resistant Gypsum Backing Panel

C1658-06.....Glass Mat Gypsum Panels

C1396-06.....Gypsum Board

E84-08.....Surface Burning Characteristics of Building Materials

C. Underwriters Laboratories Inc. (UL):

Latest Edition.....Fire Resistance Directory

D. Intertek Testing Services (ITS):

Latest Editions.....Certification Listings

**PART 2 - PRODUCTS**

**2.1 GYPSUM BOARD**

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.

1. Gypsum Ceiling Board: ASTM C1396, 13 mm (1/2 inch) thick unless shown otherwise.

B. Water Resistant Gypsum Backing Board: ASTM C1178, Type X, 16 mm (5/8 inch) thick.

C. Gypsum cores shall contain maximum percentage of post industrial recycled gypsum content available in the area (a minimum of 95 percent post industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

**2.2 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.

**2.3 JOINT MATERIAL AND REINFORCING TAPE**

Products selected shall be as recommended by the gypsum board manufacturer for the specific application conditions.

**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**

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 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. Moisture and Mold–Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in

locations which might be subject to moisture exposure during construction.

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

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

F. Ceilings:

1. For single-ply construction, use perpendicular application.
2. For two-ply assembles:
   a. Use perpendicular application.
   b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

G. 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 except gypsum board shall be applied vertically over "Z" furring channels.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Installing Two Layer Assembly Over Sound Deadening Board:
   a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.

b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 300 mm (12 inches) on center around perimeter, and 400 mm (16 inches) on center in the field.

9. Control Joints ASTM C840 and as follows:
   a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
   b. Not required for wall lengths less than 9000 mm (30 feet).
   c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.

H. Electrical and Telecommunications Boxes:
   1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

I. 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 shown.
      b. Use screws only. Do not use crimping tool.
   4. Edge Trim (casings Beads):
      a. At both sides of expansion and control joints 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.

**3.2 INSTALLING GYPSUM SHEATHING**

A. Install in accordance with ASTM C840, except as otherwise specified or shown.

B. Use screws of sufficient length to secure sheathing to framing.

C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.

D. Apply 600 mm by 2400 mm (2 foot by 8 foot) sheathing boards horizontally with tongue edge up.

E. Apply 1200 mm by 2400 mm or 2700 mm (4 ft. by 8 ft. or 9 foot) gypsum sheathing boards vertically with edges over framing.

**3.3 FINISHING OF GYPSUM BOARD**

A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for al 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, fire rated 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 fire rated 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 surface to provide fire protection equivalent to the fire rated construction.

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# SECTION 09 30 13
# CERAMIC/PORCELAIN TILING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies ceramic, porcelain, and mosaic tile; divider strips, waterproofing membranes and crack isolation membranes.

### 1.2 RELATED WORK

A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

### 1.3 SUBMITTALS

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

B. Samples:
   1. Base tile, each type, each color, each size.
   2. Mosaic floor tile panels, 225 mm by 225 mm (9 inches by 9 inches), each type, color, size and pattern.
   3. Porcelain tile, each type, color, patterns and size.
   4. Wall (or wainscot) tile, each color, size and pattern.
   5. Trim shapes, bullnose/coved cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.
   6. Aluminum finishing and edge protection shapes, each type.

C. Product Data:
   1. Ceramic, porcelain and mosaic tile, marked to show each type, size, and shape required.
   2. Chemical resistant mortar and grout (Epoxy).
   3. Dry-set Portland cement mortar and grout.
   4. Divider strip.
   5. Leveling compound.
   6. Latex-Portland cement mortar and grout.
   7. Organic adhesive.
   8. Slip resistant tile.
   9. Waterproofing isolation membrane.
   10. Reglet profiles.

D. Certification:
   1. Master grade, ANSI A137.1.
   2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
      a. Chemical resistant mortar and grout (epoxy).
      b. Modified epoxy emulsion.

c. Dry-set Portland cement mortar and grout.
d. Latex-Portland cement mortar and grout.
e. Leveling compound.
f. Organic adhesive.
g. Waterproof isolation membrane.
h. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.

**1.4 DELIVERY AND STORAGE**

A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
B. Store material to prevent damage or contamination.

**1.5 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. American National Standards Institute (ANSI):
A108.1A-13.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
A108.1B-13.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar
A108.1C-13.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
A137.1-12.....Ceramic Tile
C. American Society For Testing And Materials (ASTM):
A1064/A1064M-13.....Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
C109/C109M-13.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
C241/C241M-13.....Abrasion Resistance of Stone Subjected to Foot Traffic
C348-08.....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C627-10.....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

C954-11.....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

C1002-07(2013).....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C1027-09.....Determining Visible Abrasion Resistance of Glazed Ceramic Tile

C1028-07e1.....Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

C1178/C1178M-11.....Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel

D4397-10.....Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

D. Tile Council of America, Inc. (TCA):

2013.....Handbook for Ceramic Tile Installation

**PART 2 - PRODUCTS**

**2.1 TILE AND ACCESSORY COMPONENTS**

A. Comply with ANSI A137.1, Standard Grade, except as modified:

1. Inspection procedures listed under the Appendix of ANSI A137.1.
2. Abrasion Resistance Classification:
   a. Tested in accordance with values listed in Table 1, ASTM C1027.
   b. Class IV, 6000 revolutions for remaining areas.
3. Slip Resistant Tile for Floors:
   a. Coefficient of friction, when tested in accordance with ASTM C1028, required for level of performance:
      1) Not less than 0.7 (wet condition) for bathing areas.
      2) Not less than 0.6 for wet and dry conditions.
   b. Porcelain Paver Tile: Matte surface finish.
4. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
5. Do not use back mounted tiles in showers, unless certified by manufacturer as noted in paragraph 1.3.D.
6. Factory Blending: For tile with color variations, within the ranges selected during sample submittals blend tile in the factory and

package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

7. Factory-Applied Temporary Protective Coating:
   a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
   b. Do not coat unexposed tile surfaces.
   c. Pre-wax tiles set or grouted with epoxy or latex modified mortars.

B. Glazed Wall Tile: Cushion edges, glazing, as scheduled on Drawings.

C. Porcelain Paver Tile: Nominal 8 mm (5/16 inch) thick, with cushion edges. Porcelain tile produced by the dust pressed method shall be made of approximately 50% feldspar; the remaining 50% shall be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of between 390 to 400 pounds.

D. Trim Shapes:
   1. Conform to applicable requirements of adjoining floor and wall tile.
   2. Use slip resistant trim shapes for horizontal surfaces of showers and shower curbs.
   3. Use trim shapes sizes conforming to size of adjoining field wall tile, unless detailed or indicated otherwise on Drawings.
   4. Internal and External Corners:
      a. Square internal and external corner joints are permitted only at designated locations.
      b. External wall corners: Use extruded aluminum regletshape as indicated on Drawings.
      c. Internal wall corners: Use ceramic cove shapes as indicated on drawings.
      d. Base to floor internal corners: Use special shapes, either ceramic or extruded aluminum as indicated on drawings, providing integral cove vertical and horizontal joint.
      e. Base to floor external corners: Use special shapes, either ceramic or extruded aluminum reglet as indicated on drawings, providing integral cove vertical and horizontal joint.
      f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with coved top edge.
      g. Wall top edge external corners: Use special shapes providing coved vertical and horizontal joint edge.
      h. For glazed wall tile installed in Portland cement mortar setting bed, use cove and bullnose shapes as applicable.

i. For glazed wall tile installed in dry-set Portland cement mortar, latex-Portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.

E. Finishing and Edge Protection Reglets:

1. Straight Reglet Assembly: Extruded aluminum finishing and edge-protection for outside corners of tile surfaces; profile without an anchoring leg, open cavity for filling with mortar to secure profile in assembly. Finish: Satin anodized aluminum.
2. Coved-Shaped Reglet: Extruded aluminum finishing joint protection for wall-to-wall and wall-to-floor joints; single trapezoid-perforated anchoring leg; 9.5 mm (3/8-inch) radius coved-shaped visible surface. Finish: Satin anodized aluminum.

**2.2 GLASS MAT WATER RESISTANT GYPSUM BACKER BOARD**

Conform to ASTM C1178/C1178M.

**2.3 SETTING MATERIALS OR BOND COATS**

A. Conform to TCA Handbook for Ceramic Tile Installation.

B. Portland Cement Mortar: ANSI A108.1.

C. Latex-Portland Cement Mortar: ANSI A108.1.

1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A108.1.
2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

D. Dry-Set Portland Cement Mortar: ANSI A108.1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A108.4.

E. Organic Adhesives: ANSI A108.1, Type 1.

F. Elastomeric Waterproofing Membrane and Bond Coat:

1. TCA F122-13.
2. ANSI A108.1.
3. One component polyurethane, liquid applied material having the following additional physical properties:
   a. Hardness: Shore "A" between 40-60.
   b. Elongation: Between 300-600 percent.
   c. Tensile strength: Between 40-60 psig.
   d. No volatile compounds.
4. Coal tar modified urethanes are not acceptable.

G. Waterproofing Isolation Membrane:

1. Sheet System TCA F122-13.

2. Optional System to elastomeric waterproof membrane.
3. Composite sheet consisting of ASTM D5109, Type II, Grade I Chlorinated Polyethylene (CM) sheet reinforced on both sides with a non-woven polyester fiber.
4. Designed for use in wet areas as an isolation and positive waterproofing membranes for thin-set bonding of sheet to substrate and thin-set bonding of ceramic and porcelain tile to sheet. Suited for both horizontal and vertical applications.
5. Conform to the following additional physical properties:

| Property | Units | Results | Test Method |
|---|---|---|---|
| Hardness Shore A | Points | 70-80 | ASTM D2240 (10 Second Reading) |
| Shrinkage | Percent | 5 maximum | ASTM D1204 |
| Brittleness | | No crack remains flexible at temperature -37 degrees C (-25 degrees F) | ASTM D2497 13 mm (1/2- inch) Mandrel Bend |
| Retention of Properties after Heat Aging | Percent of original | 80 Tensile<br>80 Breaking<br>80 Elongation | ASTM D3045, 90 degrees C (194 degrees F) for 168 hours |

6. Manufacturer’s standard sheet size with prefabricated or preformed inside and outside corners.
7. Sheet manufacturer’s solvent welding liquid or xylene and edge sealant.

**2.4 GROUTING MATERIALS**

A. Coloring Pigments:
1. Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
2. Add coloring pigments to grout by the manufacturer.
3. Job colored grout is not acceptable.
4. Use is required in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.

B. Latex-Portland Cement Grout: ANSI A108.1 color as specified.
1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.
2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

C. Chemical-Resistant Grout:
1. Epoxy grout, ANSI A108.1.

**2.5 PATCHING AND LEVELING COMPOUND**

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Shall have minimum following physical properties:

1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).
3. Tensile strength - 600 psi per ANSI 118.7.
4. Density – 1.9.

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (4 inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.

D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

E. Ready for use in 48 hours after application.

**2.6 METAL DIVIDER STRIPS**

A. Aluminum terrazzo type divider strips.

B. Heavy top type strip with 5 mm (3/16 inch) wide top and 38 mm (1-1/2 inch) long leg.

C. Embedded leg perforated and deformed for keying to mortar.

**2.7 WATER**

Clean, potable and free from salts and other injurious elements to mortar and grout materials.

**2.8 CLEANING COMPOUNDS**

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic material not acceptable.

**2.9 POLYETHYLENE SHEET**

A. Polyethylene sheet conforming to ASTM D4397.

B. Nominal thickness: 0.15 mm (six mils).

C. Use sheet width to minimize joints.

**PART 3 - EXECUTION**

**3.1 ENVIRONMENTAL REQUIREMENTS**

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

**3.2 ALLOWABLE TOLERANCE**

A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
   1. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
B. Variation in Plane of Wall Surfaces:
   1. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

**3.3 SURFACE PREPARATION**

A. Patching and Leveling:
   1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
   2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
      a. Thickness of compound as required to bring finish tile system to elevation shown.
      b. Float finish, except finish smooth for elastomeric waterproofing.
      c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
   3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
   4. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
B. Mortar Bed for Slopes to Drains:
   1. Slope compound to drain where drains are shown.
   2. Install mortar bed in depressed slab sloped to drains not less than 1 in 200 (1/16 inch per foot).

3. Allow not less than 50 mm (2 inch) depression at edge of depressed slab.
4. Screed for slope to drain and float finish.
5. Cure mortar bed for not less than seven days. Do not use curing compounds or coatings.

C. Additional preparation of concrete floors for tile set with epoxy shall be in accordance with the manufacturer's printed instructions.

D. Cleavage Membrane:
1. Install polythene sheet as cleavage membrane in depressed slab when waterproof membrane is not scheduled or indicated.
2. Turn up at edge of depressed floor slab to top of floor.

E. Walls:
1. In showers or other wet areas cover studs with polyethylene sheet.
2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.

F. Existing Floors and Walls:
1. Remove existing floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.

G. Membrane:
1. Flash membrane up adjacent walls and restraining surfaces.
2. Use preformed cove, corners, and expansion joint flashing.
3. Allow membrane to cure prior to setting tile.
4. Do not allow construction traffic on membrane.

H. Waterproofing:
1. Install waterproofing in accordance with manufacturer’s instructions.
2. Return waterproofing vertically at adjacent walls in accordance to manufacturer’s details to minimum height of 101 mm (4 inches).
3. Flood test waterproof membrane after fully cured.
4. Field Quality Control water test when required.

**3.4 GLASS MAT WATER-RESISTANT GYPSUM BACKER BOARD**

A. Install in accordance with manufacturer's instructions. TCA Systems W245-01.

B. Treat joints with tape and latex-Portland cement mortar or adhesive.

**3.5 METAL DIVIDER STRIPS**

A. Install metal divider strips in floor joints between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise.

B. Set divider strip in mortar bed to line and level centered under doors or in openings.

**3.6 CERAMIC TILE - GENERAL**

A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.

B. Comply with TCA Installation Guidelines.

C. Installing Mortar Beds for Floors:

1. Install mortar bed to not damage cleavage or waterproof membrane; 32 mm (1-1/2 inch) minimum thickness.
2. Screed finish to level plane or slope to drains where shown, float finish.
3. For thin set systems cure mortar bed not less than seven (7) days. Do not use curing compounds or coatings.
4. For tile set with Portland cement paste over plastic mortar bed coordinate to set tile before mortar bed sets.

D. Setting Beds or Bond Coats:

1. Set floor tile in elastomeric bond coat over elastomeric membrane ANSI 108.13, TCA System F122 and where shown.
2. Set wall tile installed over concrete or masonry in dry-set Portland cement mortar, or latex-Portland cement mortar, ANSI 108.1B.and TCA System W211-02, W221-02 or W222-02.
3. Set tile installed over gypsum board in organic adhesive, ANSI A108.1, TCA System W242-02.
4. Set trim shapes in same material specified for setting adjoining tile.

E. Workmanship:

1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
3. Form intersections and returns accurately.

4. Cut and drill tile neatly without marring surface.
5. Cut edges of tile abutting penetrations, finish, or built-in items:
   a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
   b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.
6. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
   a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
   b. Align finish surface of new tile work flush with other and existing adjoining floor finish where shown.
   c. In areas where floor drains occur, slope to drains where shown.
   d. Shove and vibrate tiles over 200 mm (8 inches) square to achieve full support of bond coat.
9. Walls:
   a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights shown with tile.
10. Joints:
    a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
    b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.
    c. Make joints in Paver tile, porcelain type; maximum 3 mm (1/8 inch) wide.
11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
    a. Tile wall installations in wet areas, including showers.
    b. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches) or larger.

**3.7 CERAMIC TILE INSTALLED WITH PORTLAND CEMENT MORTAR**

A. Mortar Mixes for Floor, Wall And Base Tile: ANSI A108.1.except specified otherwise.

B. Installing Wall and Base Tile: ANSI A108.1, except specified otherwise.

C. Installing Floor Tile: ANSI A108.1, except as specified otherwise. Slope mortar beds to floor drains a minimum of 1 in 100 (1/8 inch per foot).

**3.8 PORCELAIN TILE INSTALLED WITH LATEX PORTLAND CEMENT BONDING MORTAR**

Due to the denseness of porcelain tile use latex Portland cement bonding mortar that meets the requirements of ANSI A108.1. Bonding mortars shall be mixed in accordance with manufacturer’s instructions. Improper liquid ratios and dwell time before placement of bonding mortar and tile shall affect bond.

**3.9 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH DRY-SET PORTLAND CEMENT AND LATEX-PORTLAND CEMENT MORTAR**

A. Installation of Tile: ANSI A108.1, except as specified otherwise.

B. Slope tile work to drains not less than 1 in 100 (1/8 inch per foot).

**3.10 THIN SET CERAMIC AND PORCELAIN TILE INSTALLED WITH ORGANIC ADHESIVE**

Installation of Tile: ANSI A108.1.

**3.11 CERAMIC AND PORCELAIN TILE INSTALLED WITH ELASTOMERIC BOND COAT**

A. Surface Preparation: Prepare surfaces as specified in paragraph 3.3G

B. Installation of Elastomeric Membrane: ANSI A108.1 and TCA F122-02.

1. Prime surfaces, where required, in accordance with manufacturer's instructions.
2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.75 to 1.3 mm (30 to 50 mils).
3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 100 mm (4 inches) above finish floor surface.
4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
5. After curing test for leaks with 25 mm (1 inch) of water for 24 hours.

C. Installation of Tile in Elastomeric Membrane:

1. Spread no more material than can be covered with tile before material starts to set.
2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

**3.12 GROUTING**

A. Grout Type and Location:

1. Grout for glazed wall and base tile, paver tile and unglazed mosaic tile: Portland cement grout, latex-Portland cement grout, dry-set grout, or commercial Portland cement grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Portland Cement grout: ANSI A108.1.
3. Epoxy Grout: ANSI A108.1.
4. Dry-set grout: ANSI A108.1.

**3.13 MOVEMENT JOINTS**

A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.

B. TCA details EJ 171-13.

C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.

D. Rake out grout at joints not less than 6 mm (1/4 inch) deep.

**3.14 CLEANING**

A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.

B. Methods and materials used shall not damage or impair appearance of tile surfaces.

C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.

D. Clean tile grouted with epoxy grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

**3.15 PROTECTION**

A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.

B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

**3.16 TESTING FINISH FLOOR**

A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

- - - E N D - - -

# SECTION 09 51 00
# ACOUSTICAL CEILINGS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Metal ceiling suspension system for acoustical ceilings.

B. Acoustical units (mineral based).

### 1.2 RELATED WORK

A. Seismic requirements: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

### 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.
2. Colored markers for units providing access.

C. Manufacturer's Literature and Data:

1. Ceiling suspension system, each type, showing complete details of installation, including suspension system and upward access system details for concealed grid systems.
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-09.....Zinc-coated (Galvanized) Carbon Steel Wire

A653/A653M-11.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process

C423-09.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

C634-11.....Standard Terminology Relating to Environmental Acoustics

C635-13.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
C636-13.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
E84-13.....Surface Burning Characteristics of Building Materials
E119-12.....Fire Tests of Building Construction and Materials
E413-10.....Classification for Rating Sound Insulation.
E580-11.....Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint
E1264-08e1.....Classification for Acoustical Ceiling Products

C. International Organization for Standardization (ISO)
ISO 14644-1.....Classification of Air Cleanliness

**PART 2 - PRODUCTS**

**2.1 METAL SUSPENSION SYSTEM**

A. ASTM C635, heavy-duty system, except as otherwise specified.
   1. Ceiling suspension system members shall be fabricated from the following unless indicated otherwise.
      a. Galvanized cold-rolled steel, bonderized.
   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 14 mm (9/16 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.

**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**

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

B. 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.

**2.5 CARRYING CHANNELS FOR SECONDARY FRAMING**

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 (AT-1)**

A. General:

1. Ceiling Tile shall meet minimum 37% bio-based content in accordance with USDA Bio-Preferred Product requirements.
2. ASTM E1264, weighing 5.2 kg/m$^2$ (1.08 psf) minimum for mineral fiber panels.
3. Class A Flame Spread: ASTM E84.
4. Minimum NRC (Noise Reduction Coefficient): 0.70 unless specified otherwise: ASTM C423.
5. Minimum CAC (Ceiling Attenuation Class): 35-44 range unless specified otherwise: ASTM E413.
6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces, except as indicated otherwise on Drawings. Colored units integrally colored throughout.
7. Lay-in panels: Sizes as shown, with beveled tegular edges.

B. Type IV Units - Mineral base with membrane-faced overlay, Form 2 - Water felted, minimum 16 mm (5/8 inch) thick. Apply over the paint coat on the face of the unit a poly (vinyl) chloride overspray having a flame spread index of 25 or less when tested in accordance with ASTM E84.

**2.7 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.

B. Use markers of the same diameter throughout building.

C. 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**

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.

**3.2 CEILING SUSPENSION SYSTEM INSTALLATION**

A. General:

1. Install metal suspension system for acoustical 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. Concrete:
   a. Install hanger wires with looped ends through steel deck if steel deck does not have attachment device.
   b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
2. 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.

C. Tile in concealed grid upward access suspension system:
   1. Install acoustical tile with joints close, straight and true to line, and with exposed surfaces level and flush at joints.
   2. Make corners and arises full, and without worn or broken places.
   3. Locate acoustical units providing access as specified under Article, ACCESS.

D. Markers:
   1. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.

2. Attach colored markers to exposed grid on opposite sides of the units providing access.
3. Attach marker on exposed ceiling surface of upward access acoustical unit.

**3.4 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 61 10
# CONCRETE FLOOR TREATMENT

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Section specifies sealing of exposed concrete floors that will not receive finish flooring materials.

### 1.2 QUALITY CONTROL AND QUALIFICATIONS

A. Safety Precautions: Take all necessary precautions against damaging adjacent surfaces and other hazards during delivery, storage, and installation of materials specified.

B. Manufacturer: Company specializing in manufacture of products specified with a minimum of five (5) years documented experience.

C. Applicator/Installer: Company specializing in performing work of this section with minimum five (5) years documented experience and approved by manufacturer.

1. Installer performing the work of this Section shall submit a statement from the sealer/hardener manufacturer stating that the subcontractor and his forces are acceptable to the manufacturer and that he is using manufacturer-approved materials and equipment.

D. Source Quality Control: Obtain primary materials required from a single manufacturer supplying principal materials for sealer/hardener. Provide secondary materials only as recommended and approved by manufacturer of primary materials.

### 1.3 SUBMITTALS

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

B. Manufacturer’s Literature and Data:

1. Copies of manufacturer’s current published literature, data sheets, installation recommendations, and maintenance instructions for materials specified shall be submitted for approval, and approval obtained before materials are delivered to the Project site.

C. Manufacturer’s Informational Submittals and Certificates:

1. Written instructions for application.
2. Written surface cleaning instructions.
3. Certificates:
   a. Certify products meet or exceed specified requirements.
   b. Certify applicator is approved by manufacturer.

**1.4 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Deliver materials in original unopened containers; labeled with manufacturer's name, brand name, installation instructions and identification of various items.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

**1.5 ENVIRONMENTAL REQUIREMENTS**

A. Do not install sealer/hardener until floor penetrations and peripheral work are complete.

B. Maintain ambient temperature and substrate temperature between 10 and 27 degrees C (50 and 80 degrees F) 24 hours before, during and 72 hours after installation of underlayment.

C. During the curing process ventilate spaces.

**1.6 APPLICABLE PUBLICATIONS**

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

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

C309-03.....Liquid Membrane-Forming Compounds for Curing Concrete

C1315-03.....Liquid Membrane-Forming Compounds Having Special Sealing Concrete

**PART 2 - PRODUCTS**

**2.1 JOB CONDITIONS**

A. Install only when surface and ambient temperatures are between 35 and 16 degrees C (95 and 60 degrees F).

B. Install prior to other finishes.

C. Provide adequate ventilation during installation.

D. Post and enforce No Smoking signs.

**2.2 MATERIALS**

A. Concrete Floor Sealer:

1. Water-based, low VOC, high solids acrylic copolymer solution that cures, seals and dustproofs concrete with minimal yellowing.
2. Conforms to ASTM C309 and ASTM C1315, Type I, Grade B. Sealer shall have a VOC content no greater than 100 g/L in accord with SCAQMD Rule #1168.
3. Solids Content: Minimum 30 percent by volume.
4. Primer: As recommended by manufacturer.

B. Material shall be VOC compliant per applicable Federal, State and Local rules, regulations and authorities having jurisdiction, with the most stringent requirements governing.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Examine substrates and verify surfaces are clean, dry, do not contain petroleum by-products, or other contaminating compounds detrimental to underlayment material bond to substrate.

B. Notify A/E in writing if any conditions or surfaces exist which the Installer considers detrimental to the proper and expeditious installation of his work.

C. Starting Work of this section shall imply acceptance of the surfaces and conditions to perform the work as specified.

**3.2 PREPARATION**

A. Verify that concrete was steel troweled and hair broomed and is free of fins, ridges or voids.

B. Assure that curing agents used are compatible with coating system or completely removed.

C. Concrete must be cured for minimum of 28 days, with moisture content not exceeding 8 percent.

D. Remove surface contamination by cleaning or if necessary by sandblasting.

E. Patch holes or voids.

F. Rout out cracks exceeding 1.6 mm (1/16-inch) wide and calk.

G. Calk non-moving joints up to 25 mm (one inch) wide with suitable backer and sealant.

H. Do not calk or overcoat joints where movement exceeds 25 percent or joints over 25 mm (1 inch) wide.

I. These joints must receive other joint treatment to assure watertightness.

J. Install test patch.

K. If test patch indicates lack of adhesion, install primer.

**3.3 INSTALLATION**

A. DO NOT apply to surfaces scheduled to subsequently receive cementitious coatings or toppings, such as concrete, terrazzo, polyester or epoxy coatings.

B. Apply by airless spray, long handled roller or brush.

C. Apply in accordance with manufacturer's recommendations; minimum two coats.

D. Apply first coat at not over 0.025m2/L (400 SF/GAL).

E. Apply subsequent coat at a coverage rate not over 0.025m2/L (400 SF/GAL).

F. Allow no traffic on sealed surface for 72 hours after application.

**3.4 PATCHING AND CLEANING**

A. Patch areas which fail to match adjacent work.

B. Clean surface broom clean after completion of work.

C. Remove debris resulting from these operations.

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# SECTION 09 67 23.60
# RESINOUS (URETHANE AND EPOXY MORTAR) FLOORING (RES-6A/RES-6A1)

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies Resinous (Resinous urethane and epoxy mortars) flooring with integral cove base:
   1. High Abuse Climatic Troweled and Sealed Urethane Mortar Flooring System.

### 1.2 RELATED WORK

A. Concrete and Moisture Vapor Barrier: Section 03 30 00, CAST-IN-PLACE CONCRETE.
B. Floor Drains: Division 22, PLUMBING.

### 1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data:
   1. Description of each product to be provided.
   2. Application and installation instructions.
   3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.
C. Qualification Data: For Installer.
D. Samples:
   1. Each color and texture indicated on Drawings.
   2. Samples for verification: For each (color and texture) resinous flooring system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.
   3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.
E. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
   1. Patterns.
   2. Edge configurations.
F. Certifications and Approvals:
   1. Manufacturer's certification of material and substrate compliance with specification.
   2. Manufacturer's approval of installer.

3. Contractor's certificate of compliance with Quality Assurance requirements.

G. Warranty: As specified in this section.

**1.4 QUALITY ASSURANCE**

A. Manufacture Certificate: Manufacture shall certify that a particular resinous flooring system has been manufactured and in use for a minimum of five (5) years.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a minimum period of five (5) years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
2. Contractor shall have completed at least five (5) projects of similar size and complexity. Include list of at least five (5) projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
3. Installer's Personnel: Employ persons trained for application of specified product.

C. Source Limitations:

1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.

D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and establish quality standards for materials and execution.

1. Apply full-thickness mockups on 48 inch (1200 mm) square floor area selected by VA Resident Engineer.
   a. If applicable include 48 inch (1200 mm)length of integral cove base.
2. Apply full-thickness mockup in shower area floor and include textured quartz finish and/or glass bead sealer as required to meet slip-resistance coefficient requirements. Final acceptance of mockup will be determined by the VA.

3. Approved mockups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
4. Sign off from VA Resident Engineer on texture for slip resistance and clean ability must be complete before installation of flooring system.

E. Pre-Installation Conference:
1. Convene a meeting not less than 30 days prior to starting work.
2. Attendance:
   a. Contractor.
   b. VA Resident Engineer.
   c. Manufacturer and Installer's Representative.
3. Review the following:
   a. Environmental Requirements:
      1) Air and surface temperature.
      2) Relative humidity.
      3) Ventilation.
      4) Dust and contaminates.
   b. Protection of surfaces not scheduled to be coated.
   c. Inspect and discus condition of substrate and other preparatory work performed.
   d. Review and verify availability of material; installer’s personnel, equipment needed.
   e. Design, pattern and edge conditions.
   f. Performance of the coating with chemicals anticipated in the area receiving the resinous (urethane and epoxy mortar/cement) flooring system.
   g. Application and repair.
   h. Field quality control.
   i. Cleaning.
   j. Protection of coating systems.
   k. One-year inspection and maintenance.
   l. Coordination with other work.

F. Manufacturer’s Field Services: Manufacturer’s representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.

G. Contractor Job Site Log: Contractor shall document daily; the work accomplished environmental conditions and any other condition event significant to the long term performance of the urethane and epoxy mortar/cement flooring materials installation. The Contractor shall maintain these records for one year after Substantial Completion.

H. Volatile Organic Compound content to remain under 100g/liter.

**1.5 MATERIAL PACKAGING DELIVERY AND STORAGE**

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.

B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.

C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).

D. Keep containers sealed until ready for use.

E. Do not use materials beyond manufacturer’s shelf life limits.

F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages. No On site weighing or volumetric measurements are allowed.

**1.6 PROJECT CONDITIONS**

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring applications.

1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

D. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

**1.7 WARRANTY**

A. Work subject to the terms of the Article “Warranty of Construction” FAR clause 52.246-21.

B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for a extended period of three (3) full years from date of installation, or provide a joint and several warranty signed on a single

document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of three (3) full years from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

**1.8 APPLICABLE PUBLICATIONS**

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

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

B221-08.....Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

C307-03 (2008).....Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings

C413-01(2006).....Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes

C531-00(2005).....Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C579-01(2006).....Standard Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C580-02(2008).....Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

C811-98(2008).....Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacings

D1308-02(2007).....Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D2047-04 .....Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

D2240-05.....Standard Test Method for Rubber Property — Durometer Hardness
D4060-07.....Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
D4226-09.....Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
D7234-05.....Standard Test Methods for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
F1869-09.....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-09.....Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 501.....Finishes for Aluminum

**PART 2 - PRODUCTS**

**2.1 SYSTEM DESCRIPTION FOR RES-6A AND RES-6A1 (HEAVY DUTY CLIMATIC)**

A. System Descriptions:
1. Monolithic, multi-component urethane chemistry resinous flooring system, Screed and steel finish trowel applied, chemical and thermal cycling and shock resistant. Self-priming multiple component polyurethane mortar, acrylic flake aggregates for texture and associated high performance urethane sealer. Temperature resistance to 250 degrees F (121 degrees C) where required.
2. RES-6A1: Resilient urethane, similar to above, with flexible resin binders.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify mortar base product, build up layers of broadcast systems will not be accepted. Verify compatibility with substrate. Use manufacturer’s standard components, compatible with each other and as follows:
1. Mortar (Body Coat):
a. Resin: Urethane with rapidly renewable resin components.

b. Formulation Description: Multiple component high solids.
c. Application Method: Screed and steel finish trowel.
d. Thickness of Coat(s): Verify thickness as systems vary by manufacturer; nominal thickness 3/16 to 1/4 inch (4.76 to 6.35mm).
e. Number of Coats: One.
f. Aggregates: Acrylic flake texture broadcast into wet urethane mortar base.

2. Seal Coat(s):
a. Resin: Urethane.
b. Formulation Description: Pigmented Two-component, high solids.
c. Application Method: Squeegee and Back roll.
d. Number of Coats: One.

D. Physical Properties:
1. Physical Properties of flooring system when tested as follows:

| Property | Test | Value |
|---|---|---|
| Compressive Strength | ASTM C579 | 5,000 psi after 7 days |
| Tensile Strength | ASTM C307 | 1,000 psi |
| Flexural Strength | ASTM C580 | 2,400 psi |
| Water Absorption | ASTM C413 | 0.056% |
| Coefficient of friction dry/slip index wet | ASTM D2047 | >1.0 dry<br>>1.0 wet |
| Impact Resistance | ASTM D4226 | > 160 in. lbs |
| Abrasion Resistance | ASTM D4060 | 0.05 gm maximum weight loss |
| Thermal Coefficient of Linear Expansion | ASTM C531 | $1.1 \times 10^{-5}$ mm/ °C mm |
| Hardness Shore D | ASTM D2240 | 80 to 84 |
| Bond Strength | ASTM D7234 | >300 psi 100% concrete failure |
| Chemical Resistance of the following:<br>Acetic acid<br>Ammonium hydroxide<br>Citric Acid<br>Fatty acid Motor Oil, 20W<br>Hydrochloric acid<br>Salt water<br>Sodium Hydroxide<br>Sulfuric acid<br>Trisodium phosphate | ASTM D1308<br><br>5 percent<br>10 percent<br>50 percent<br><br><br>10 percent<br><br>10 percent<br>10 percent<br>5 percent | No Effect |

| | |
|---|---|
| Urine | |
| Feces | |
| Hydrogen peroxide | 28 percent |
| Distilled Water | |
| Sodium Hypochloride | 5.28 percent |

**2.2 SUPPLEMENTAL MATERIALS**

A. Textured Top Coat: Type recommended or produced by manufacturer of seamless resinous flooring system, slip resistance type and profile for desired final finish.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditions indicated.

C. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous flooring for conditions as indicated in Drawings and/or specified.

D. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc.

E. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resinous based materials only. Cementitious or single component product are not expectable.

F. Vapor/Waterproofing: Type recommended or produced by manufacturer of resinous flooring as required to prepare substrates to receive flooring system.

**2.3 TROWELED COVE BASE**

Same physical properties as specified resinous mortar system; climatic.

**2.4 BASE CAP STRIP**

A. Aluminum, Extruded: ASTM B221, Alloy 6063-T6.

B. Shape for 3/16 inch (4.76 mm) depth of base material, "J" configuration.

C. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
2. Aluminum: NAAMM Amp 501:
   a. Clear anodic coating, AA-C22A41 chemically etched medium matte, with Architectural Class 1, 0.7 mils (0.018 mm) or thicker.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

A. Examine the areas and conditions where monolithic resinous (urethane and epoxy mortar) flooring system with integral base is to be installed with the VA Resident Engineer present.

B. Moisture Vapor Emission Testing: Perform moisture vapor transmission testing in accordance with ASTM F1869 to determine the MVER of the substrate prior to commencement of the work. See Article 3.4 B.3 below.
   1. Conduct testing of existing and new slab locations intended to receive resinous flooring systems.

**3.2 PROJECT CONDITIONS**

A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F (21 and 32 degrees C) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 70 degrees F (21 degrees C) during cure period.
B. Maintain relative humidity less than 75 percent.
C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.
D. Maintain proper ventilation of the area during application and curing time period.
   1. Comply with infection control measures of the VA Medical Center.

**3.3 INSTALLATION REQUIREMENTS**

A. The manufacturer's instructions for application and installation shall be reviewed with the VA Resident Engineer for the seamless resinous (urethane and epoxy mortar) flooring system with integral cove base.
B. Floor and base substrates designated to receive flooring system shall be approved by manufacturer’s technical representative.

**3.4 PREPARATION**

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
   1. Prepare concrete substrates as follows:
      a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re circulates the shot by vacuum pickup.
   2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
   3. Verify that concrete substrates are dry.
      a. Perform anhydrous calcium chloride test, ASTM F1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of **5 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.

b. MVT threshold for monolithic resinous climatic flooring shall not exceed 6 lbs/1000 square feet (0.0002155 kPa) over a 24 hour period.

c. When MVT emission exceeds this limit, apply manufacturer’s recommended vapor/waterproofing control primer or other corrective measures as recommended by manufacturer prior to application of flooring or membrane systems. Use appropriate corrective measures as required for each type of flooring system.

d. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75-80 percent.

1) Provide a written report showing test placement and results.

4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with flooring system application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for flooring manufacturer recommended joint fill material, and concrete crack treatment.

F. Prepare wall to receive integral cove base:

1. Verify wall material is acceptable for resinous flooring application, if not, install material (e.g. cement board) to receive base.
2. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane, and/or crack isolation membrane) as recommended by resinous flooring manufacturer.
3. Install base prior to flooring if required by resinous flooring manufacturer.
4. Grind, cut or sand protrusions to receive base application.

**3.5 APPLICATION**

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components and supplemental materials to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

B. Apply Cove Base: Trowel to wall surfaces at a 25 mm (1 inch) radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.

C. Trowel Mortar Base: Mix mortar material according to manufacturer's recommended procedures. Climatic resinous flooring systems may vary slightly on mode of application. Application should be based upon the following: Uniformly spread mortar over substrate using a specially designed screed box adjusted to manufacturer's recommended height. Metal trowel (hand or power) single mortar coat in thickness indicated for flooring system, grout to fill substrate voids. When cured, sand to remove trowel marks and roughness

D. Topcoat: Mix and roller apply the topcoat(s) with strict adherence to manufacturer's installation procedures and coverage rates.

**3.6 TOLERANCE**

A. From line of plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base.

B. From radius of cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

**3.7 CURING, PROTECTION AND CLEANING**

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous flooring materials from damage and wear during construction operation.
   1. Cover flooring with kraft type paper.
   2. Optional 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.

D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

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# SECTION 09 91 00
# PAINTING

## PART 1-GENERAL

### 1.1 DESCRIPTION

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

B. Work to be Painted:
   1. Painting and finishing of interior work, and painting of mechanical and electrical systems, except as specified under Article, WORK NOT TO BE PAINTED.
   2. Painting and finishing of work as scheduled on Drawings.
   3. Painting and finishing of existing work as specified under Article, REFINISHING.

C. Work NOT to be Painted:
   1. Prefinished Items: Casework, doors, elevator entrances and cabs, prefabricated metal building, equipment, and similar items specified under other sections.
   2. Concealed Surfaces: Inside dumbwaiter, elevator and duct shafts, pipe basements, crawl spaces, pipe tunnels, above ceilings.
   3. Finished Surfaces: Anodized aluminum, stainless steel, chromium plating, copper, brass.
   4. Moving and Operating Parts: Shafts, chains, gears, mechanical and electrical parts such as valve stems, operators, linkages, sprinkler heads, sensing devices.
   5. Labels: Any code required label such as Underwriters Laboratories Inc., or Factory Mutual Research Corporation, identification plates, instruction plates, performance rating, nomenclature.

### 1.2 RELATED WORK

A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 10 - SPECIALTIES, Division 11 - EQUIPMENT, Division 12 - FURNISHINGS, Division 14 – CONVEYING EQUIPMENT, Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY sections.

B. Type of Finish, Color, and Gloss Level of Finish Coat: As scheduled on Drawings.

**1.3 QUALITY ASSURANCE**

A. Paint Color and Texture:
   1. In general, color and texture of finish coats, as scheduled on Drawings.
   2. For additional requirements regarding color, see Articles REFINISHING AND FIELD PAINTING OF MECHANICAL AND ELECTRICAL SYSTEM.

B. 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.

C. Painting, Caulking, Closures, 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 plastic laminate or stainless steel.

D. Before starting any application of water paint mixtures apply paint as specified to an area not to exceed 100 SF selected by Resident Engineer. Finish and texture approved by Resident Engineer shall be used as a standard of quality for remainder of work.

**1.4 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 the following:
   1. Manufacturer's literature, indicating brand names, kind, color, texture, composition of vehicle and pigment.
   2. Current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award. Each coating system shall 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.
   3. Federal Specification Number where applicable and certificates as specified.
   4. Description for each type of product and application to be used.
   5. Installation instructions for each type of product and application to be used.
   6. Manufacturers' Certificates indicating compliance with specified requirements.

C. Samples:
   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), show each color as scheduled on Drawings.
   3. Attach labels to panel stating the following:
      a. Federal Specification Number or manufacturers name and product number of paints used.
      b. Veterans Administration Master Paint Color Code Number (for paint).
      c. Specification code number.
      d. Product type, color, and finish texture.
      e. 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.
   5. Sample of identity markers if used.
D. Submit one complete set of applicable American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Booklet and Document publications for use by the Resident Engineer.

**1.5 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.
   4. Master Paint Institute (MPI) Code Number, where applicable.
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).

E. Safety: Observe all required safety regulations and the manufacturer's warning and instructions during the storage, handling and application of painting materials.
   1. Necessary precautions shall be taken 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 the end of each days work.

F. Lead-Base Paint: The responsibility of compliance with Section 401 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with the implementing regulations promulgated by the Secretary of Housing and Urban Development is placed upon the Contractor. Regulations concerning the prohibition against the use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.

**1.6 MOCK-UP PANEL**

A. Before starting application of water paint mixtures, apply paint as specified to an area, not to exceed 9 $m^2$ (100 $ft^2$), selected by Resident Engineer.

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

**1.7 ENVIRONMENTAL REQUIREMENTS**

A. Do no exterior painting during rain or snow, or when relative humidity is above 50 percent.

B. Do no interior painting in foggy, damp or rainy weather.

C. Paint interior surfaces when the ambient temperature is between 7 and 32 degrees C (45 and 90 degrees F), except when water thinned paints are used, the ambient temperature shall be between 10 and 32 degrees C (50 and 90 degrees F), unless otherwise designated in the manufacturer's printed instructions. Maintain these temperatures until the paint dries hard.

D. Apply only on clean and dry surfaces. Apply water thinned acrylic paints to damp (not wet) surfaces where allowed by the manufacturer's printed instructions.

E. Do no painting in direct sunlight or on surfaces which will soon be warmed by the sun.

**1.8 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-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)

C. American National Standards Institute (ANSI):
A13.1-07.....Scheme for the Identification of Piping Systems

D. American Society for Testing and Materials (ASTM):
E84-13a.....Surface Burning Characteristics of Building Materials
E119-12a.....Fire Tests of Building Construction and Materials

E. Federal Specifications (Fed Spec):
TT-F-322D (1).....Filler, Two Component Type, for Dents, Cracks, Small-Holes and Blow-Holes
TT-P-641G (1).....Primer Coating, Zinc Dust Zinc Oxide (For Galvanized Surfaces)
TT-P-645A.....Primer, Paint Zinc Chromate, Alkyd Type
TT-P-650C (1).....Primer Coating, Latex Base, Interior, White (For Gypsum Wallboard)

F. Master Painters Institute (MPI):
No. 1-12.....Aluminum Paint (AP)
No. 4-12.....Interior/ Exterior Latex Block Filler
No. 9-12.....Exterior Alkyd Enamel MPI Gloss Level 6 (EO)
No. 11-12.....Exterior Latex, Semi-Gloss (AE)
No. 18-12.....Organic Zinc Rich Primer
No. 22-12.....Aluminum Paint, High Heat (up to 590% - 1100F) (HR)
No. 26-12.....Cementitious Galvanized Metal Primer
No. 27-12.....Exterior / Interior Alkyd Floor Enamel, Gloss (FE)
No. 45-12.....Interior Primer Sealer
No. 46-12.....Interior Enamel Undercoat
No. 47-12.....Interior Alkyd, Semi-Gloss, MPI Gloss Level 5 (AK)

No. 50-12.....Interior Latex Primer Sealer
No. 51-12.....Interior Alkyd, Eggshell, MPI Gloss Level 3
No. 52-12.....Interior Latex, MPI Gloss Level 3 (LE)
No. 53-12.....Interior Latex, Flat, MPI Gloss Level 1 (LE)
No. 54-12.....Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)
No. 77-12.....Epoxy Cold Cured, Gloss (EC)
No. 95-12.....Fast Drying Metal Primer
No. 101-12.....Epoxy Anti-Corrosive Metal Primer
No. 114-12.....Interior Latex, Gloss (LE) and (LG)
No. 134-12.....Waterborne Galvanized Primer
No. 135-12.....Non-Cementitious Galvanized Primer

G. Steel Structures Painting Council (SSPC):
SSPC SP 1-04 (R2004)....Solvent Cleaning
SSPC SP 2-04 (R2004)....Hand Tool Cleaning
SSPC SP 3-04 (R2004)....Power Tool Cleaning

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Plastic Tape:
1. Pigmented vinyl plastic film in colors as indicated on Drawings.
2. Pressure sensitive adhesive back.
3. Widths as shown.

B. Identity markers options:
1. Pressure sensitive vinyl markers.
2. Snap-on coil plastic markers.

C. Aluminum Paint (AP): MPI 1.
D. Interior/Exterior Latex Block Filler: MPI 4.
E. Exterior Alkyd Enamel (EO): MPI 9.
F. Exterior Latex, Semi-Gloss (AE): MPI 11.
G. Organic Zinc rich Coating (HR): MPI 18.
H. High Heat Resistant Coating (HR): MPI 22.
I. Interior Primer Sealer: MPI 45.
J. Interior Enamel Undercoat: MPI 47.
K. Interior Alkyd, Semi-Gloss (AK): MPI 47.
L. Interior Latex Primer Sealer: MPI 50.
M. Interior Alkyd, Eggshell: MPI 51
N. Interior Latex, MPI Gloss Level 3 (LE): MPI 52.
O. Interior Latex, Flat, MPI Gloss Level 1 (LE): MPI 53.
P. Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE): MPI 54.

Q. Epoxy Cold Cured, Gloss (EC): MPI 77.
R. Fast Drying Metal Primer: MPI 95.
S. Epoxy Anti-Corrosive Metal Primer: MPI 101.
T. Interior latex, Gloss (LE) and (LG): MPI 114.
U. Waterborne Galvanized Primer: MPI 134.
V. Non-Cementitious Galvanized Primer: MPI 135.

**2.2 PAINT PROPERTIES**

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
B. Materials shall be finely ground, uniform in consistency and readily dispersed to form a smooth and homogeneous fluid.
C. 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**

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. Lead-Base Paint:
      a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
      b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
   3. Asbestos: Materials shall not contain asbestos.
   4. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
   5. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
   6. Use high performance acrylic paints in place of alkyd paints, where possible.

7. 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**

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
   1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
   2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each days work.

B. Atmospheric and Surface Conditions:
   1. Do not apply coating when air or substrate conditions are:
      a. Less than 3 degrees C (5 degrees F) above dew point.
      b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
   2. Maintain interior temperatures until paint dries hard.
   3. Do no exterior painting when it is windy and dusty.
   4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
   5. Apply only on clean, dry and frost free surfaces except as follows:
      a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
      b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.

**3.2 SURFACE PREPARATION**

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:
   1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
   2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
   3. Fill holes, cracks, depressions with patching compound. Finish flush with adjacent surface with texture to match surrounding surface.
   4. Surfaces to be finished shall be cleaned, washed, dried, smooth and prepared as specified. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.
   5. Materials and methods used for cleaning shall be compatible with the substrate and specified finish. Remove any residue remaining from cleaning agents used.
   6. See other sections of the specifications for requirements for surface conditions and prime coat.

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

5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

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

E. Masonry, Concrete, Cement Board, Cement Plaster and Stucco:
1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.
2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
3. Remove loose mortar in masonry work.
4. Replace mortar and fill open joints, holes, cracks and depressions with new mortar specified in Section 04 05 13, MASONRY MORTARING. Do not fill weep holes. Finish to match adjacent surfaces.
5. Neutralize Concrete floors to be painted by washing with a solution of 1.4 Kg (3 pounds) of zinc sulfate crystals to 3.8 L (1 gallon) of water, allow to dry three days and brush thoroughly free of crystals.
6. Repair broken and spalled concrete edges with concrete patching compound to match adjacent surfaces as specified in CONCRETE Sections. Remove projections to level of adjacent surface by grinding or similar methods.

F. Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
2. Remove dust, dirt, and other deterrents to paint adhesion.
3. Fill holes, cracks, and other depressions with CID-A-A-1272A Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1 inch) in diameter as specified in Section for plaster or gypsum board.

**3.3 PAINT PREPARATION**

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.

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

**3.4 APPLICATION**

A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
C. Before application of body and finish coats, surfaces shall be primed, except as otherwise specified.
D. Additional field applied prime coats over shop or factory applied prime coats are not required, except for exterior steel which shall have a field applied prime coat in addition to the shop prime coat.
E. Retouch damaged and abraded painted surfaces before applying succeeding coats.
F. Apply each coat evenly and cover substrate completely.
G. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Resident Engineer.
H. Finish painted surfaces shall have solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
I. Apply by brush, roller or spray, except as otherwise specified.
J. Do not spray paint in existing occupied spaces unless approved by Resident Engineer, except in spaces sealed from existing occupied spaces.
   1. Apply painting materials specifically required by manufacturer to be applied by spraying.
   2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of

sterilizes and other recessed equipment and similar prefinished items.

K. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

**3.5 PRIME PAINTING**

A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.

D. Prime rebates for face glazing of steel.

E. Metals except boilers, incinerator stacks, and engine exhaust pipes:

1. Steel and iron: MPI 95 (Fast Drying Metal Primer). Use MPI 101 (Cold Curing Epoxy Primer) where MPI 77 (Epoxy Cold Cured, Gloss (EC)) finish is specified.
2. Zinc-coated steel and iron: MPI 134 (Waterborne Galvanized Primer) or MPI 135 (Non-Cementitious Galvanized Primer).
3. Aluminum scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
4. Terne Metal: MPI 95 (Fast Drying Metal Primer).
5. Copper and copper alloys scheduled to be painted: MPI 95 (Fast Drying Metal Primer).
6. Machinery not factory finished: MPI 9 (Exterior Alkyd Enamel (EO)).
7. Asphalt coated metal: MPI 1 (Aluminum Paint (AP)).
8. Metal over 94 degrees C. (200 degrees F): MPI 22 (High Heat Resistant Coating (HR)).

F. Gypsum Board and Hardboard:

1. Surfaces scheduled to have MPI 53 (Interior Latex, Flat), MPI Gloss Level 1 LE)), MPI 52 (Interior Latex, MPI Gloss Level 3 (LE)), MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)), or MPI 114 (Interior Latex, Gloss (LE) and (LG)) finish: Use MPI 53 (Interior Latex, MPI Gloss Level 3 (LE)), MPI 52 (Interior Latex, MPI Gloss Level 3 (LE)), MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)), MPI 114 (Interior Latex, Gloss (LE) and (LG)) respectively.
2. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) in shower and bathrooms.
3. Surfaces scheduled to receive vinyl coated fabric wallcovering:

Use MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat).

4. Use MPI 101 (Cold Curing Epoxy Primer) for surfaces scheduled to receive MPI 77 (Epoxy Cold Cured, Gloss (EC)) finish.

G. Concrete Masonry Units except glazed or integrally colored and decorative units:

1. MPI 4 (Block Filler) on interior surfaces.
2. Prime exterior surface as specified for exterior finishes.

H. Concrete Masonry, Interior Surfaces of Ceilings and Walls:

1. MPI 52 (Interior Latex, MPI Gloss Level 3 (LE)) or MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)) or MPI 114 (Interior Latex, Gloss (LE) and (LG)), except use two coats where substrate has aged less than six months.
2. Use MPI 114 (Interior Latex, Gloss (LE) and (LG)) or MPI 77 (Epoxy Cold Cured, Gloss (EC) as scheduled.

**3.6 EXTERIOR FINISHES**

A. Steel and Ferrous Metal:

1. Two coats of MPI 9 (Exterior Alkyd Enamel (EO)) on exposed surfaces, except on surfaces over 94 degrees C (200 degrees F).

B. Machinery without factory finish except for primer: One coat MPI 9 (Exterior Alkyd Enamel (EO)).

**3.7 INTERIOR FINISHES**

A. Apply following finish coats over prime coats in spaces or on surfaces as scheduled on Drawings.

B. Metal Work:

1. Apply to exposed surfaces.
2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
   a. Apply two coats of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) unless specified otherwise.
   b. Two coats of MPI 51 (Interior Alkyd, Eggshell (AK)).
   c. One coat of MPI 46 (Interior Enamel Undercoat) plus one coat of MPI 47 (Interior Alkyd, Semi-Gloss (AK)) on exposed interior surfaces of alkyd-amine enamel prime finished windows.
   . Machinery: One coat MPI 9 (Exterior Alkyd Enamel (EO)).
   d. Asphalt Coated Metal: One coat MPI 1 (Aluminum Paint (AP)).
   e. Ferrous Metal over 94 degrees K (200 degrees F): One coat MPI 22 (High Heat Resistant Coating (HR).

C. Gypsum Board:
   1. One coat of MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) plus one coat of MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)) or MPI 114 (Interior Latex, Gloss (LE) and (LG)).
D. Masonry and Concrete Walls:
   1. Over MPI 4 (Interior/Exterior Latex Block Filler) on CMU surfaces.
   2. Two coats of MPI 52 (Interior Latex, MPI Gloss Level 3 (LE)) or MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)) or MPI 114 (Interior Latex, Gloss (LE) and (LG)).
E. Miscellaneous:
   1. Apply as scheduled or indicated on Drawings.
   2. MPI 1 (Aluminum Paint): Two coats of aluminum paint.
   3. Gold Paint (GP): Two coats of gold paint.
   4. Existing acoustical units scheduled to be repainted except acoustical units with a vinyl finish:
      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)).

**3.8 REFINISHING EXISTING PAINTED SURFACES**

A. Clean, patch and repair existing surfaces as specified under surface preparation.
B. Remove and reinstall items as specified under surface preparation.
C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
G. Sand or dull glossy surfaces prior to painting.
H. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

**3.9 PAINT COLOR**

A. Color and gloss of finish coats as scheduled or indicated on Drawings.

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.

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

A. Field painting of mechanical and electrical consists of cleaning, touching-up abraded shop prime coats, and applying prime, body and finish coats to materials and equipment if not factory finished in space scheduled to be finished.

B. In spaces not scheduled to be finish painted, paint as specified under paragraph H. Colors.

C. Paint various systems specified in Division 21 – FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 – HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 – ELECTRONIC SAFETY AND SECURITY.

D. Paint after tests have been completed.

E. Omit prime coat from factory prime-coated items.

F. Finish painting of mechanical and electrical equipment is not required when located above suspended ceilings, in concealed areas such as pipe and electric closets, 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 to match surrounding surfaces, as specified or indicated on Drawings.
   2. Paint colors as scheduled on Drawings 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. Federal Safety Yellow:  Where specified, at locations indicated on Drawings and elsewhere as required by Federal Agencies.

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

1. Exterior Locations:

a. Apply two coats of MPI 11 (Exterior Latex, Semi Gloss (AE)) to the following metal items:
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, cast-iron radiators, electric conduits and panel boards.

3) Heating, ventilating, air conditioning, plumbing equipment, and machinery having shop prime coat and not factory finished.

b. Apply one coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 54 (Interior Latex, Semi-Gloss, MPI Gloss Level 5 (LE)) on finish of insulation on piping.

c. Apply two coats of MPI 22 (High Heat Resistant Coating (HR)) to ferrous metal surface over 94 degrees K (200 degrees F).

3. Other Exposed Locations:

a. Metal surfaces, except aluminum, of cooling towers exposed to view, including connected pipes and rails: Two coats of MPI 1 (Aluminum Paint (AP)).

b. Cloth jackets of insulation of ducts and pipes in connection with plumbing, air conditioning, ventilating refrigeration and heating systems: One coat of MPI 50 (Interior Latex Primer Sealer) and one coat of MPI 11 (Exterior Latex Semi-Gloss (AE).

**3.11 BUILDING AND STRUCTURAL WORK FIELD PAINTING**

A. Painting and finishing of interior and exterior work except as specified under paragraph 3.11 B.
   1. Painting and finishing of new and existing work including colors and gloss of finish selected as scheduled or indicated on Drawings.
   2. Painting of disturbed, damaged and repaired or patched surfaces when entire space is not scheduled for complete repainting or refinishing.
   3. Painting of ferrous metal and galvanized metal.
   4. Identity painting and safety painting.

B. Building and Structural Work **NOT** Painted:
   1. Prefinished Items:
      a. Casework, doors, wall covering, and similar items specified factory finished under other sections.
      b. Factory finished equipment and pre-engineered metal building components.
   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, above ceilings, except as otherwise specified.
      b. Inside walls or other spaces behind access doors or panels.
      c. Surfaces concealed behind permanently installed casework and equipment.
   4. Moving and Operating Parts:
      a. Shafts, chains, gears, mechanical and electrical operators, linkages, and sprinkler heads, and sensing devices.
      b. Tracks for coiling doors.
   5. Labels:
      a. Code required label, such as Underwriters Laboratories Inc., Intertek Testing Services, Inc., or Factory Mutual Research Corporation.
      b. Identification plates, instruction plates, performance rating, and nomenclature.

6. Galvanized Metal:
   a. Except where specifically specified to be painted.
7. Gaskets.
8. Concrete curbs.
9. Structural steel encased in concrete, masonry, or other enclosure.
10. Structural steel to receive sprayed-on fire proofing.

**3.12 IDENTITY PAINTING SCHEDULE**

A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.
   1. Legend may be identified using pressure sensitive vinyl markers or by stencil applied (painted on) 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 m (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:

| 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 | | Brown | White | Fuel Oil-Grade __* |
| (Diesel Fuel included under Fuel Oil) | | | | |
| 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 |

Hot Water Supply Domestic/Solar Water H.W. Sup Dom/SW
Hot Water Return Domestic/Solar Water H.W. Ret Dom/SW

7. See Sections for methods of identification, legends, and abbreviations of the following:
   a. 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; and Section 28 05 28.33, RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY.

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

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

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

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# SECTION 09 97 33.10
# RESINOUS COATING SYSTEMS FOR WALLS AND CEILINGS (RES-W)

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies a seamless wall coating system.

B. Wall systems consist of multi component epoxy resins, primer base and finishing coats.

### 1.2 SUBMITTALS

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

B. Manufacturer's Literature and Data:

1. Description of each product to be provided.
2. Application and installation instructions.
3. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.

C. Qualification Data: For Installer.

D. Sustainable Submittal:

1. Product data for products having recycled content, submit documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
   a. Include statements indicating costs for each product having recycled content.
2. Product data for field applied, interior, paints, coatings, and primers, include printed statement of VOC content indicating compliance with environmental requirements.

E. Samples:

1. Each color and texture specified in Section 09 06 00, SCHEDULE FOR FINISHES.
2. Samples for verification: For each (color and texture) resinous wall/ceiling system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.
3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished resinous coating must match the approved samples in color and texture.

F. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:

1. Patterns.
2. Edge configurations.

G. Certification and Approval:
1. Manufacturer's certification of material and substrata compliance.
2. Manufacturer's approval of installer.
3. Contractor's certificate of compliance with Quality Assurance requirements.

H. Warranty: As specified in this section.

**1.3 QUALITY ASSURANCE**

A. Manufacture Certificate: Manufacture shall certify that a particular resinous coating for wall/ceiling system has been in use for a minimum of five years.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous coating for wall/ceiling systems similar in material, design, and extent to those indicated for this project for a minimum period of 5 years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous coating for wall/ceiling manufacturer.
1. Engage an installer who is certified in writing by resinous product manufacturer as qualified to apply resinous coatings for wall/ceiling systems indicated.
2. Contractor shall have completed at least 10 projects of similar size and complexity. Include list of at least 5 projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
3. Installer's Personnel: Employ persons trained for application of specified product.

C. Source Limitations:
1. Obtain primary resinous coating materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.

D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and establish quality standards for materials and execution.

1. Apply full-thickness mockups on 48 inch (1200 mm)square area (wall/ceiling) selected by VA Resident Engineer.
2. Test mock-up with anticipated chemicals to be used in the designated area.
3. Approved mockups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
4. Sign off from VA Resident Engineer on texture must be complete before installation of wall/ceiling system.

E. Pre-Installation Conference
1. Convene a meeting not less than thirty days prior to starting work.
2. Attendance:
   a. Contractor
   b. VA Resident Engineer
   c. Manufacturer and Installer's Representative
3. Review the following:
   a. Environmental requirements
      1) Air and surface temperature
      2) Relative humidity
      3) Ventilation
      4) Dust and contaminates
   b. Protection of surfaces not scheduled to be coated
   c. Inspect and discus condition of substrate and other preparatory work performed
   d. Review and verify availability of material; installer’s personnel, equipment needed
   e. Design and patterns and edge conditions.
   f. Performance of the coating with chemicals anticipated in the area receiving the resinous coating system
   g. Application and repair
   h. Field quality control
   i. Cleaning
   j. Protection of coating systems
   k. One-year inspection and maintenance
   l. Coordination with other work

F. Manufacturer’s Field Services: Manufacturer’s representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

**1.4 MATERIAL PACKAGING DELIVERY AND STORAGE**

A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number, date of manufacture and mixing/thinning instructions.

B. Protect materials from damage and contamination in s storage or delivery, including moisture, heat, cold, direct sunlight, etc.

C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).

D. Keep containers sealed until ready for use.

E. Do not use materials beyond manufacturer’s shelf life limits.

F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages.

**1.5 PROJECT CONDITIONS**

A. Environmental Limitations: Comply with resinous wall/ceiling manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous wall/ceiling applications.

1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous wall/ceiling application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous wall/ceiling application.

C. Close spaces to traffic during resinous wall/ceiling application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

**1.6 WARRANTY**

A. Work subject to the terms of the Article “Warranty of Construction” FAR clause 52.246-21.

B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for a extended period of (3) full years from date of installation, or provide a joint and several warranty signed on a single document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (3) full years

from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

**1.7 APPLICABLE PUBLICATIONS**

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

B. ACI (American Concrete institute):
Comm. 503.1-92.....Four Epoxy Specifications (Reapproved 2003).

C. American Society for Testing and Materials (ASTM):
D16-08.....Standard Terminology for Paint, Related Coatings, Materials, and Applications
D4259-88(2006).....Standard Practice for Abrading Concrete
D4263-83(2005).....Standard Test Method for Indicating Moisture **in** Concrete by the Plastic Sheet Method
F1869-09.....Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

D. International Concrete Repair Institute (ICRI) Guideline No.:
03732 (2008).....Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

E. International Concrete Repair Institute (ICRI) Guideline No.:
03732 (2008).....Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

F. The Society for Protective Coatings SSPC:
SP 13/NACE 6 (2008).....Surface Preparation of Concrete

**PART 2 - PRODUCTS**

**2.1 SYSTEM DESCRIPTION**

A. Epoxy resinous wall system includes: 100% solids two component epoxy primers, and base coats. Vinyl chip broadcast aggregates and associated 100% solids general service epoxy sealer. Optional: aliphatic polyurethane sealer finish coat for higher UV stability, and chemical resistance.

B. System Characteristics.
1. Color and pattern: As indicated on drawings.

2. Wearing Surface: Smooth
3. Overall System Thickness: 15-20 mils.

C. System Components: Manufactures standard components that are compatible with each other, and as follows:

1. **Primer Formulation Description**: Multi-component 100% solids epoxy.
2. **Formulation Description: Body Coat**:
   a. Resin: epoxy
   b. Formulation Description: Two component 100% solids
   c. Application Method: Dip and roll
   d. Coats: One
   e. Thickness: 10 mils (wet).
   f. Aggregates: Solid/single color pigmented quartz blended
3. **Sealer Finish Coat**:
   a. Resin: epoxy
   b. Formulation Description: Two Component 100% solids
   c. Type: clear
   d. Finish: Gloss
   e. Number of coats: One or two
   f. Application Method: back roll nap roller
4. Optional 100% solids urethane for UV and increased chemical protection.

**2.2 SPECIAL WALL COATING SYSTEM**

A. Physical Properties of flooring system when tested as follows:

| Property | Test | Value |
|---|---|---|
| Hardness | ASTM D2240 | 80-85 |
| Bond Strength (Concrete Only) | ASTM D7234 | >300 psi 100% concrete failure |
| Impact Resistance | ASTM D2794 | Exceeds 40in. lbs |
| Abrasion Resistance | ASTM D4060 | 0.08 gm maximum weight loss |
| Fire Resistance of dry film | | Self extinguishing |
| Impact Resistance (Concrete Only) | ASTM D4226 | > 160 in. lbs |
| Resistance to elevated temperatures | MIL D 3134J | No slip or flow at 158f |
| VOC | | < 100 G/L |

B. Primer, Coloring, Sealer, and Finish coats as standard with manufacture of resinous system.

C. Base cap: Extruded aluminum, clear anodized finish unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

**2.3 ACCESORY MATERIALS**

A. Patching and Fill Material: Resinous product of or approved by resinous manufacturer for application indicated.

**PART 3 – EXECUTION**

**3.1 PROJECT CONDITIONS**

A. Maintain temperature of materials above 21 degrees C (70 degrees F), for 48 hours before installation.

B. Maintain temperature of rooms where work occurs, between 21 degrees C and 32 degrees C (70 degrees F and 90 degrees F) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 21 degrees C (70 degrees F) thereafter.

C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

D. Area free of other trades during and for a period of 24 hours after installation.

**3.2 INSTALLATION REQUIREMENTS**

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

B. Submit proposed installation deviation from this specification to the Resident Engineer indicating the differences in the method of installation.

**3.3 PREPARATION**

A. General: Prepare and clean substrates according to manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous application.

B. Substrates: Provide sound surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible.

1. Prepare substrates as follows:

a. Mechanically sand or hand grind if previously applied coating is present.

b. Comply with ASTM C811 requirements, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated substrate according to manufacturer's written recommendations.

3. Verify that substrates are dry.

C. Resinous Materials: Mix components and prepare materials according to manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

**3.4 APPLICATION**

A. **General**: Apply components of resinous wall system according to manufacturer's written instructions to produce a uniform, monolithic surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous system to substrate, and optimum inter-coat adhesion.

2. Cure resinous components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

B. **Apply Primer**: over prepared substrate at manufacturer's recommended spreading rate.

C. **Base coat(s):** Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating.

D. **Topcoat**: Mix and roller apply the topcoat(s) with strict adherence to manufacturer's installation procedures and coverage rates.

**3.5 CURING, PROTECTION AND CLEANING**

A. Cure resinous materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

B. Close area of application for a minimum of 24 hours.

C. Protect resinous materials from damage and wear during construction operation.

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# SECTION 10 11 13
# CHALKBOARDS AND MARKERBOARDS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies chalkboards, markerboards and related items.

B. Boards may be either factory or field assembled.

C. Where shown, assemble either chalkboards or markerboards with tackboards into a single unit.

### 1.2 QUALITY ASSURANCE

Boards shall be the products of one manufacturer.

### 1.3 SUBMITTALS

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

B. Shop Drawings: Identifying all parts by name and material and showing design, construction, installation, anchorage and relation to adjacent construction.

C. Manufacturer's Literature and Data:

1. Chalkboard.
2. Markerboard.

D. Samples:

1. Chalkboard and markerboard writing surface, 300 x 300 mm (6 x 6 inches), each color, mounted on backing.
2. Integrally colored anodized aluminum, 300 mm (6 inch) length.

### 1.4 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 National Standards (ANSI):

Z97.1-09.....Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

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

B221/B221M-08.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

C1036-06.....Flat Glass

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

F104-03(R2009).....Nonmetallic Gasket Materials

D. Composite Panel Association (CPA):
A208.1-09.....Particleboard
A135.4-04.....Basic Hardboard
E. Porcelain Enamel Institute (PEI):
1001-11.....Architectural Porcelain Enamel

**PART 2 - PRODUCTS**

**2.1 CHALKBOARD AND MARKERBOARD**

A. Chalkboards and markerboards shall consist of a writing surface, snap on aluminum frame, chalk trough, mullions, display rail and accessories, grounds and other items specified and shown.
B. Sizes as indicated on the Drawings.

**2.2 FABRICATION**

A. Materials:
1. Aluminum, extruded: ASTM B221.
2. Backing: Hardboard, AHBA A135.4 or particleboard, CPA A208.1.
B. Components:
1. Writing Surface: Factory assembly consisting of face sheet of 24 gauge sheet steel with porcelain enamel board texture finish conforming to PEI 1001, laminated to a hardboard or particleboard backing, 9 mm to 13 mm (3/8 to 1/2-inch) thick, and a 0.13 mm (0.005-inch) thick aluminum foil back sheet laminated to back-face.
2. Frames (Trim): Extruded aluminum, 1.5 mm (0.060-inch) thick, snap-on type, approximate face width 44 mm (1-3/4 inch), depth and configuration as required to return to wall and engage clips.
3. Trough: Extruded aluminum, 2.34 mm (0.092-inch) thick, not less than 75 mm (3-inch) projection from writing surface with grooved top surface, closed ends and return to wall surface at underside. Design to be snap-on type with concealed fasteners.
4. Mullions: Snap-on type, same material and face width as frames, designed to finish flush with frame.
5. Grounds: Continuous zinc-coated (galvanized) steel or extruded aluminum members designed to support the board writing surface and clips for snap-on frames, map rail and chalk tray.
6. Clips: Manufacturer's standard as required to support frame, mullions, display rail, and trough.
C. Boards 3660 mm (12 feet) or less in length shall be in one piece. Larger units shall have one joint at center. Joints shall have metal spline, with faces in same plane and edges shall touch along entire length.

D. Finish exposed aluminum surfaces as follows:
   1. AA 45 chemically etched medium matte, with clear anodic coating Class II Architectural, 0.4 mils thick (AA-M12C22A32).

**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

A. Install units in accordance with the manufacturer's installation instructions, use concealed fasteners.
B. Inspect surfaces and related construction to receive units. Partitions shall have reinforcing to receive fasteners. Verify type and placement of reinforcement.
C. Do not proceed with the installation until reinforcement is in place and surfaces are flat.
D. Assemble units as specified by the manufacturer.

**3.2 INSTALLATION OF CHALKBOARD AND MARKERBOARD**

A. Mount board with adhesive and blocking pads spaced 16 inches on center each way.
B. Grounds designed to receive clips for snap-on trim shall be continuous and be secured 300 mm (12 inches) on center. Space clips 300 mm (12 inches) on center.
C. Miter trim at corners, conceal fasteners. Modify trim as required to conform to surrounding construction details.

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# SECTION 10 14 00
# SIGNAGE

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies interior signage for room numbers, directional signs, code required signs, telephone identification signs and temporary interior signs.

### 1.2 MANUFACTURER'S QUALIFICATIONS

Sign manufacturer shall provide evidence that they regularly and presently manufacture signs similar to those specified in this Section as one of their principal products.

### 1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Samples: Sign panels and frames, with letters and symbols, each type. Submit 2 sets. One set of samples will be retained by Resident Engineer, other returned to Contractor.

1. Sign Panel, 200 mm x 250 mm (8 inches x 10 inches), with letters.
2. Submit full scale paper sign of each door sign.
3. Color samples of each color, 150 mm x 150 mm (6 inches x 6 inches. Show anticipated range of color and texture.
4. Sample of typeface, arrow and symbols in a typical full size layout.

C. Manufacturer's Literature:

1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
2. Manufacturer’s printed specifications, anchorage details, installation and maintenance instructions.

D. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.

1. Topography sample for message strips and headers copy.
2. Artwork for special graphics.
3. Signage schedule complete with sign location of each sign and required sign copy; include a floor plan indicating locations of scheduled signs.

E. Full size layout patterns for dimensional letters.

### 1.4 DELIVERY AND STORAGE

A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.

B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.

C. Deliver signs only when the site and mounting services are ready for installation work to proceed.

D. Store products in dry condition inside enclosed facilities.

**1.5 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):
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and tubes.

C. Federal Specifications (Fed Spec):
MIL-PRF-8184F.....Plastic Sheet, Acrylic, Modified.
MIL-P-46144C.....Plastic Sheet, Polycarbonate

**1.6 MINIMUM SIGN REQUIREMENTS**

A. Permanent Rooms and Spaces:

1. Tactile and Braille Characters, raised minimum 0.793 mm (1/32-inch). Characters shall be accompanied by Grade 2 Braille.
2. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed and Helvetica Regular.
3. Character Height: Minimum 16 mm (5/8-inch) high, Maximum 50 mm (2 inches).
4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 inches) high.
5. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
6. Mounting Location and Height: As shown. Mounted on wall adjacent to the latch side of the door and to avoid door swing and protruding objects.

B. Overhead Signs:

1. Type Styles: As shown. Characters shall have a width-to-height ratio between 3:5 and 1:1. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.

2. Character Height: minimum 75 mm (3 inches) high for overhead signs. As shown, for directional signs.
3. Finish and Contrast: Same as for signs of permanent rooms and spaces.
4. Mounting Location and Height: As shown.

**1.7 COLORS AND FINISHES**

As indicated on the Drawings.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

A. Signs of type, size and design shown on the drawings and as specified.
B. Signs complete with lettering, framing and related components for a complete installation.
C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
D. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. Resident Engineer to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.
E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

**2.2 PRODUCTS**

A. Aluminum:
   1. Sheet and Plate: ASTM B209.
   2. Extrusions and Tubing: ASTM B221.
B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic shall not be acceptable.
C. Polycarbonate: MIL-P-46144C; Type I, class 1.
D. Vinyl: 0.1 mm thick machine cut, having a pressure sensitive adhesive and integral colors.

**2.3 SIGN STANDARDS**

A. Topography:
   1. Type Style: Helvetica Medium and Helvetica Medium Condensed. Initial caps or all caps as indicated in Sign Message Schedule.
   2. Arrow: See graphic standards in drawings.
   3. Letter spacing: See graphic standards on drawings.
   4. Letter spacing: See graphic standards on drawings.
   5. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in drawings are for layout purposes only; final text for signs is listed in Sign Message Schedule.

B. Project Colors and Finishes: As indicated on the Drawings.

**2.4 SIGN TYPES**

A. General:
   1. The interior sign system is comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.

B. IN indicates a component construction based sign.
   1. The sign system shall be comprised of sign types families that are identified by a letter and number which identify a particular group of signs. An additional number identifies a specific type of sign within that family.

C. Interchangeable Component System:
   1. Sign Type Families: 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, and 17.
   2. Interior sign system capable of being arranged in a variety of configurations with a minimum of attachments, devices and connectors.
      a. Interchangeable nature of the system shall allow for changes of graphic components of the installed sign, without changing sign in its entirety.
      b. Component Sign System is comprised of the following primary components:
         1) Rail Back utilizing horizontal rails, spaced to allow for uniform, modular sizing of sign types.
         2) Rail Insert mounted to back of Copy Panels to allow for attachment to Rail Back.
         3) Copy Panels, made of a variety of materials to allow for different graphic needs.

4) End Caps which interlock to Rail Back to enclose and secure changeable Copy Panels.
5) Joiners and Accent Joiners connect separate Rail Backs together.
6) Top Accent Bars which provide decorative trim cap that encloses the top of sign or can connect the sign to a Type 03 Room Number Sign.

c. Rail Back, Rail Insert and End Caps in anodized extruded aluminum to allow for tight tolerances and consistent quality of fit and finish.
d. Signs in system shall be convertible in the field to allow for enlargement from one size to another in height and width through use of Joiners or Accent Joiners, which connect Rail Back panels together blindly, providing a butt joint between Copy Panels. Accent Joiners shall connect Rail Backs together with a visible 3 mm (1/8-inch) horizontal rib, flush to the adjacent copy insert surfaces.
e. Sign configurations shall vary in width from 225 mm (9 inches) to 2050 mm (80 inches), and have height dimensions of 50 mm (2 inches), 75 mm (3 inches), 150 mm (6 inches), 225 mm (9 inches) and 300 mm (12 inches). Height shall be increased beyond 300 mm (12 inches), by repeating height module in full or in part.

3. Rail Back functions as internal structural member of sign using 6063T5 extruded aluminum and anodized black.
   a. Shall accept an extruded aluminum or plastic insert on one sign or on both sides, depending upon sign type.
   b. Shall be convertible in field to allow for connection to other Rail Back panels, so that additive changes can be made to sign unit.
   c. Rail shall allow for a variety of mounting devices including wall mounting for screw-on applications, using pressure sensitive tape, freestanding mount, ceiling mount and other mounting devices as needed.
4. Rail Insert functions as a mounting device for Copy Panels on to the Rail Back. The Rail Insert mounts to the back of the Copy Panel with adhesive suitable for use with the particular copy insert material.
   a. Shall allow Copy Panels to slide or snap into the horizontal Rail Back for ease of changeability.
   b. Shall mount to the back of the Copy Panel with adhesive suitable for use with particular Copy Panel material.

5. Copy Panels shall accept various forms of copy and graphics, and attaches to the Rail Back with the Rail Insert. Copy Panels shall be either ABS plastic with integral color or an acrylic lacquer finish; photo polymer; or, acrylic.
   a. Interchangeable by sliding horizontally from either side of sign, and to other signs in system of equal or greater width or height.
   b. Cleanable without use of special chemicals or cleaning solutions.
   c. Copy Insert Materials.
      1) ABS Inserts - 2.3 mm (0.090 inch) extruded ABS plastic core with .07 mm (0.003 inch) acrylic cap bonded during extrusion/texturing process. Pressure bonded to extruded Rail Insert using adhesive. Background color is either integral or painted in acrylic lacquer. ABS inserts finished in a chromium industries #HM335RA texture pattern to prevent glare.
      2) Photo polymer Inserts - 3 mm (0.125 inch) phenolic photo polymer with raised copy etched to 2.3 mm (0.0937 inch), bonded to an ABS plastic or extruded aluminum insert with adhesive. Background color is painted in acrylic enamel.
      3) Changeable Paper/ Insert Holder - Extruded insert holder with integral Rail Insert for connection with structural back panel in 6063T5 aluminum with a black anodized finish. Inserts into holder are paper with a clear 0.7 mm (0.030 inch) textured cover. Background color is painted in acrylic lacquer.
      4) Acrylic - 2 mm (0.080 inch) non-glare acrylic. Pressure bonded to extruded Rail Insert using adhesive. Background color is painted in acrylic lacquer or acrylic enamel.
      5) Extruded 6063T5 aluminum with a black anodized finish Insert Holder with integral Rail Insert for connection with Structural Back Panel to hold a 0.7 mm (0.030 inch) textured polycarbonate insert and a Sliding Tile which mounts in the Inset Holder and slides horizontally.
      6) End Caps - Extruded using 6063T5 aluminum with a black anodized. End Caps interlock with Rail Back with clips to form an integral unit, enclosing and securing the changeable Copy Panels, without requiring tools for assembly.
         a) Shall be interchangeable to either end of sign and to other signs in the system of equal height.
         b) Mechanical fasteners can be added to the End Caps that will secure it to Rail Back to make sign tamper resistant.

7) Joiners - Extruded using 6063T5 aluminum with a black anodized finish. Rail Joiners connect Rail Backs together blindly, providing a butt joint between Copy Inserts.
8) Accent Joiners - Extruded using 6063T5 aluminum with a mirror polished finish. Joiner shall connect Rail Backs together with a visible 3 mm (0.125 inch) horizontal rib, flush to the adjacent Copy Panel surfaces.
9) Top Accent Rail - Extruded using 6063T5 aluminum with a mirror polished finish. Rail shall provide 3 mm (0.125 inch) high decorative trim cap, which butts flush to adjacent Copy Panel and encloses top of Rail Back and Copy Panel.
10) Typography
    a) Vinyl First Surface Copy (non-tactile) - Applied Vinyl copy.
    b) Subsurface Copy Inserts - Textured 1 mm (0.030 inch) clear polycarbonate face with subsurface applied Vinyl copy. Face shall be back sprayed with paint and laminated to an extruded aluminum carrier insert.
    c) Integral Tactile Copy Inserts - phenolic photo polymer etched with 2.3 mm (0.0937 inch) raised copy.
    d) Silk-screened First Surface Copy (non-tactile) - Injection molded or extruded ABS plastic or aluminum insert with first surface applied enamel silk-screened copy.

C. Sign Type Family 01, 08, and 09:
1. All text and graphics are to be first surface silk-screened.
2. IN-01.12 and IN-01.13: Refer to Sign Type 03 specification for tactile and Braille portion of sign.
3. IN-01.1: Preparation of artwork for reproduction of "fire and emergency evacuation maps" is by manufacturer.

D. Sign Type Families 03:
1. Tactile sign is to be made from a material that provides for letters, numbers and Braille to be integral with sign plaque material such as: photosensitive polyamide resin, etched metal, sandblasted phenolic or embossed material. Do not apply letters, numbers and Braille with adhesive.
2. Numbers, letters and Braille to be raised 0.793 mm (0.0312 inch) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
3. Braille dots are to conform with standard dimensions for literary Braille:
   a. Dot base diameter: 1.5 mm (0.059 inch).

b. Inter-dot spacing: 2.3 mm (0.090 inch).
c. Horizontal separation between cells: 6.0 mm (0.241 inch).
d. Vertical separation between cells: 10.0 mm (0.395 inch).

4. Entire assembly is painted in specified color. After painting, apply white or other specified color to surface of the numbers and letters. Entire sign is to have a protective clear coat sealant applied.
5. Complete sign is to have an eggshell finish (11 to 19 degree on a 60 degree glossmeter).

E. Sign Type Family 04 and 11:
1. All text and graphics are to be first surface applied vinyl letters.
2. IN-04: When a Type IN-04 is to be mounted under a Type IN03, a connecting Accent Joiner is to be used to create a singular integrated sign.

F. Sign Type Family 07:
1. A11 text and graphics are to be first surface applied vinyl letters except for under sliding tile.
2. Protect text, which is covered by sliding tile, so tile does not wear away letters.

G. Sign Type Family 10:
1. Pocket depth is to be 0.3 mm (0.0150 inch).

H. Sign Type Family 14:
1. A11 text and graphics are to be first surface applied vinyl letters.
2. IN-14.06: When added to top of IN-14.01, IN-14.04, or IN-14.05 a connecting Accent Joiner is to be used to create a singular integrated sign.

I. Sign Type Family 18:
1. A11 text and graphics are to be first surface applied stylus cut vinyl letters.
2. Provide in specified typeface, color and spacing, with each message or message group on a single quick release backing sheet.

J. Temporary Interior Signs:
1. Fabricated from 50 kg (110 pound) matte finished white paper cut to 100 mm (4 inches) wide by 300 mm (12 inches) long. Punched 3 mm (0.125 inch) hole with edge of hole spaced 13 mm (0.5 inch) in from edge and centered on 100 mm (4 inch) side. Reinforce hole on both sides with suitable material that prevents tie form pulling through hole. Ties are steel wire 0.3 mm (0.120 inch) thick attached to tag with twist leaving 150 mm (6 inch) long free ends.

2. Mark architectural room number on sign, with broad felt marker in clearly legible numbers or letters that identify room, corridor or space as shown on floor plans.
3. Install temporary signs to all rooms that have a room, corridor or space number. Attach to door frame, door knob or door pull.
   a. Doors that do not require signs are: corridor doors in corridor with same number, folding doors or partitions, toilet doors, bathroom doors within and between rooms, closet doors within rooms, communicating doors in partitions between rooms with corridor entrance doors.
   b. Replace and missing damaged or illegible signs.

**2.5 FABRICATION**

A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 degrees C (100 degrees F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.
C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces smooth, flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inch). Restore texture to filed or cut areas.
F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth su1rfaces.
G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.
H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.
J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate

or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.

K. Movable parts, including hardware, are be cleaned and adjusted to operate as designed without binding of deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.

L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

M. No signs are to be manufactured until final sign message schedule and location review has been completed by the Resident Engineer & forwarded to contractor.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.

B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact Resident Engineer for clarification.

C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.

D. Remove or correct signs or installation work Resident Engineer determines as unsafe or as an unsafe condition.

E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces that became soiled or damaged as a result of installation of signs.

F. Locate signs as shown on the Sign Location Plans.

G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign

being installed. This blank glass back up is to be the same size as sign being installed.

H. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.

I. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

- - - END - - -

# SECTION 10 21 13
# TOILET COMPARTMENTS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies metal toilet partitions.

### 1.2 RELATED WORK

A. Overhead structural steel supports for ceiling hung pilasters: Section 05 50 00, METAL FABRICATIONS.

B. Grab bars and toilet tissue holders: Section 10 28 00, TOILET AND BATH ACCESSORIES.

### 1.3 SUBMITTALS

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

B. Samples: Prime coat of paint on 150 mm (6 inch) square of metal panel with baked enamel finish coat over half of panel.

C. Manufacturer's Literature and Data: Specified items indicating all hardware and fittings, material, finish, and latching.

D. Shop Drawings: Construction details at 1/2 scale, showing installation details, anchoring and leveling devices.

E. Manufacturer's certificate, attesting that zinc-coatings conform to specified requirements.

### 1.4 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. Federal Specifications (Fed. Spec.):
FF-B-575C.....Bolt, Hexagon and Square

C. Code of Federal Regulations (CFR):
40 CFR 247.....Comprehensive Procurement Guidelines for Products Containing Recovered Materials

D. Commercial Item Descriptions (CID):
A-A-1925.....Shield, Expansion (Nail Anchors)
A-A-60003.....Partitions, Toilet, Complete

## PART 2 - PRODUCTS

### 2.1 TOILET PARTITIONS

A. Conform to Fed. CID A-A-60003, except as modified herein.

B. Fabricate to dimensions shown or specified.

C. Toilet Enclosures:
   1. Type 1, Style B (Ceiling hung).
   2. Reinforce panels shown to receive toilet tissue holders or grab bars.
   3. Upper pivots and lower hinges adjustable to hold doors open 30 degrees.
   4. Latching devices and hinges for handicap compartments shall comply with ADA requirements.
   5. Keeper:
      a. U-slot to engage bar of throw latch.
      b. Combined with rubber bumper stop.
   6. Wheelchair Toilets:
      a. Upper pivots and lower hinges to hold out swinging doors in closed position.
      b. Provide U-type doors pulls, approximately 100 mm (4 inches) long on pull side.
   7. Finish:
      a. Finish 3 (stainless steel) enclosure panels.

**2.2 FASTENERS**

A. Partition Fasteners: CID A-A-60003.
B. Use expansion bolts, CID A-A-60003, for anchoring to solid masonry or concrete.
C. Use toggle bolts, CID A-A-60003, for anchoring to hollow masonry or stud framed walls.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. General:
   1. Install in rigid manner, straight, plumb and with all horizontal lines level.
   2. Conceal evidence of drilling, cutting and fitting in finish work.
   3. Use hex-bolts for through-bolting.
   4. Adjust hardware and leave in freely working order.
   5. Clean finished surfaces and leave free of imperfections.
B. Panels and Pilasters:
   1. Support panels and pilaster abutting building walls near top and bottom by stirrup supports secured to partitions with through-bolts.
   2. Secure stirrups to walls with two suitable anchoring devices for each stirrup.

3. Secure panels to faces of pilaster near top and bottom with stirrup supports, through-bolted to panels and machine screwed to each pilaster.
4. Secure edges of panels to edges of pilasters near top and bottom with "U" shaped brackets.

- - - E N D - - -

# SECTION 10 26 00
# WALL AND DOOR PROTECTION

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section specifies wall guards (crash rails or bumper guards) and corner guards.

### 1.2 RELATED WORK

A. Armor plates and kick plates not specified in this section: Section 08 71 00, DOOR HARDWARE.

### 1.3 SUBMITTALS

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

B. Shop Drawings: Show design and installation details.

C. Manufacturer's Literature and Data:

1. Wall Guards.
2. Corner Guards.

D. 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 degrees 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(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

E84-09.....Surface Burning Characteristics of Building Materials

C. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....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: ASTM B221, Alloy 6063, Temper T5 or T6.

**2.2 CORNER GUARDS (CG-1)**

A. Stainless Steel Corner Guards: Fabricate of 1.6 mm (0.0625-inch) thick stainless steel. Form guards of dimensions and to contour shown.

**2.3 WALL GUARDS AND HANDRAILS (CR-1)**

A. Aluminum Wall Guards: Extruded aluminum, 6 mm (1/4 inch) thick x 100 mm (4 inch) wide bar with radius edges mounted on wall beam brackets as shown.

1. Rail Support Brackets: Aluminum beam section with radius edges; designed to hold back of rail 76 mm (3 inches) from wall surface. Space not over 1200 mm (48 inches) on center.
2. Fabricate wall guards with radiused internal and external corners, following general plane of wall surface, wit rail offsets as required. Terminate ends with a smooth 76 mm (3 inch) radius, ending 13 mm (1/2 inch) from wall surface.

**2.4 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.

**2.5 FINISH**

A. In accordance with NAAMM AMP 500 series.

B. Aluminum: AAC22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mil thick.

C. Stainless Steel: NAAMM finish Number 4.

**PART 3 - INSTALLATION**

**3.1 STAINLESS STEEL CORNER GUARDS (CG-1)**

A. Mount guards on external corners of interior walls, partitions and columns as shown.

B. Where corner guards are installed on walls, partitions or columns finished with plaster or ceramic tile, anchor corner guards as shown on drawings. Provide continuous 16 gage perforated, galvanized Z-shape

steel anchors welded to back edges of corner guards and expansion bolted to concrete or masonry with four 9.5 mm (3/8-inch) diameter bolts, spaced 400 mm (16 inches) on centers. Coat back surfaces of corner guards, where shown, with a non-flammable, sound deadening material. Corner guards shall overlap finish plaster surfaces.

1. Where corner guards are installed on exposed structural glazed facing tile units or masonry wall, partitions or columns, anchor corner guards as shown on the drawings or anchor corner guards to existing walls with 6 mm (1/4-inch) oval head stainless steel countersunk expansion or toggle bolts. Grout spaces solid between guards and backing with Portland cement and sand mortar.
2. Where corner guards are installed on gypsum board, clean surface and anchor guards with a neoprene solvent-type contact adhesive specifically manufactured for use on gypsum board construction. Remove excess adhesive from around edge of guard and allow to cure undisturbed for 24 hours.

**3.2 ALUMINUM WALL GUARDS (CR-1)**

Secure brackets to walls with fasteners, spaced in accordance with manufacturer's installation instructions.

- - - E N D - - -

# SECTION 10 28 00
# TOILET AND BATH ACCESSORIES

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies manufactured items usually used in toilet rooms, shower areas, and at sinks in related spaces.

B. Items Specified:

1. Grab Bars.
2. Shower curtain rods.
3. Clothes hooks - robe and accessible robe, or coat.
4. Metal framed mirror.

C. This section also specifies custom fabricated items used in toilets and related spaces.

D. This sections DOES NOT include items provided by the VA for installation by Contractor (e.g., toilet paper dispensers, paper towel dispensers, waste receptacles, wall mounted liquid soap dispensers, hand sanitizers, etc.).

### 1.2 RELATED WORK

A. Support for accessories: Section 05 50 00, METAL FABRICATIONS.

### 1.3 SUBMITTALS

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

B. Shop Drawings:

1. Each product specified.
2. Metal framed mirrors, and design and installation of units when installed on ceramic tile wainscots and offset surfaces.
3. Robe hooks, and design and installation of units when installed on ceramic tile and offset surfaces.
4. Shower Curtain rods, showing required length for each location, and design and installation of units when installed on ceramic tile and offset surfaces.
5. Grab bars, showing design and each different type of anchorage.
6. Show material and finish, size of members, and details of construction, installation and anchorage of items.

C. Samples:

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.

**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(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
A176-99(R2009).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service
A312/A312M-09.....Seamless and Welded Austenitic Stainless Steel Pipes

A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B456-03(R2009).....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
C1036-06.....Flat Glass
D635-10.....Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position
F446-85(R2009).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.

C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

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**

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.

G. Plywood: PS1, Grade CD.

**2.2 FASTENERS**

A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
B. Concealed Fasteners: Steel, hot-dip galvanized (except in high moisture areas such as showers use stainless steel).
C. Toggle Bolts: For use in hollow masonry or frame construction.
D. Hex Bolts: For through bolting on thin panels.
E. Expansion Shields: Lead or plastic as recommended by accessory manufacturer for component and substrate for use in solid masonry or concrete.
F. Screws:
   1. ASME B18.6.4.
   2. Fed Spec. FF-S-107, Stainless steel Type A.
G. Adhesive: As recommended by manufacturer for products to be joined.

**2.3 FINISH**

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.
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.

**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. Reinforce doors to prevent warp or twist.
F. Isolate aluminum 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.
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**

VA furnished – Contractor installed.

**2.6 TOILET TISSUE DISPENSERS**

VA furnished – Contractor installed.

**2.7 GRAB BARS (GB)**

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.
C. Concealed mount, except grab bars mounted at floor and swing up.
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.
   2. Fabricate in one continuous piece with ends turned toward walls, except swing up and where grab bars are shown continuous around three sides of showers, bars may be fabricated in two sections, with concealed slip joint between.
   3. Continuous weld intermediate support to the grab bar.
   4. Swing up bars manually operated. Designed to prevent bar from falling when in raised position.
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. Flange for Exposed Mounting:
   1. Minimum 5 mm (3/16 inch) thick, approximately 75 mm (3 inch) diameter.
   2. Insert grab bar through flange and continuously weld perimeter of grab bar flush to backside of flange.

3. Where mounted on metal toilet partitions, provide three equally spaced, countersunk holes, sized to accommodate 5 mm (3/16 inch) diameter bolts.
4. Where mounted on floor, provide four equally spaced holes, sized to accommodate 5 mm (3/8 inch) diameter bolts, not more than 5 mm (3/8 inch) from edge of flange.

G. 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 SHOWER CURTAIN RODS (SR)**

A. Stainless steel tubing, ASTM A569, minimum 1.27 mm (0.050 inch) wall thickness, 32 mm (1-1/4 inch) outside diameter.
B. Flanges, stainless steel rings, 66 mm (2-5/8 inch) minimum outside diameter, with 2 holes opposite each other for 6 mm (1/4 inch) stainless steel fastening bolts. Provide a set screw within the curvature of each flange for securing the rod.
C. Intermediate support for rods over 1800 mm (6 feet) long. Provide adjustable ceiling flanges with set screws, tubular hangers and stirrups.

**2.9 CLOTHES HOOKS - ROBE OR COAT (RH, ARH)**

A. Fabricate hook units either of chromium plated brass with a satin finish, or 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.

**2.10 METAL FRAMED MIRRORS (M)**

A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 302 or 304.
B. Mirror Glass:
1. Minimum 6 mm (1/4 inch) thick.
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:
   a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface.
   b. 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.

**2.11 SOAP AND HAND SANITIZER DISPENSERS**

VA furnished – Contractor installed.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

A. Before starting work notify Resident Engineer in writing of any conflicts detrimental to installation or operation of units.
B. Verify with the Resident Engineer 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. Toggle bolt to steel anchorage plates in frame partitions or hollow masonry.
C. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.
D. Install accessories plumb and level and securely anchor to substrate.
E. 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.
F. Position and install dispensers with ample clearance between countertop and devices and between adjacent devices, permitting ready access for maintenance as needed.

G. Align mirrors and other accessories even and level.

H. Install accessories to prevent striking by other moving, items or interference with accessibility.

**3.3 SCHEDULE OF ACCESSORIES**

Items and locations are indicated on the Drawings.

**3.4 CLEANING**

After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

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# SECTION 10 44 13
# FIRE EXTINGUISHER CABINETS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

This section covers recessed fire extinguisher cabinets.

### 1.2 RELATED WORK

A. Acrylic glazing: Section 08 80 00, GLAZING.

B. Field Painting: Section 09 91 00, PAINTING.

### 1.3 QUALITY ASSURANCE

A. Manufacturer and Product Qualifications: Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly engaged in manufacturing items of the type specified. Additional or better features, not specifically prohibited by the specifications, but which are parts of the manufacturer's standard commercial product shall be included in the product.

B. Source Limitations: Each product type shall be the same made by the same manufacturer.

### 1.4 SUBMITTALS

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

B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

### 1.5 APPLICATION 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 of Testing and Materials (ASTM):
D4802-10.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet

## PART 2 - PRODUCTS

### 2.1 FIRE EXTINGUISHER CABINET

Recessed type with flat trim of size and design to suit extinguisher sizes in use (minimum 2.5 gallon capacity extinguishers) and as directed by the Resident Engineer.

### 2.2 FABRICATION

A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.

B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.

1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
2. Design doors to open 180 degrees.
3. Provide continuous hinge, pull handle, and adjustable roller catch.

**2.3 FINISH**

A. Finish interior of cabinet body with baked-on semigloss white enamel.
B. Finish door, frame with manufacturer's standard baked-on prime coat suitable for field painting.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.
B. Install cabinet so that bottom of cabinet is 975 mm (39 inches) above finished floor.

- - - E N D - - -

# SECTION 10 51 31
# METAL LOCKERS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies metal lockers with hinged doors, and hardware, including associated components.

B. Lockers shall be in accordance with seismic requirements.

### 1.2 RELATED WORK

A. Steel shapes for wall anchoring: Section 05 50 00, METAL FABRICATIONS.

B. Seismic anchoring: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

### 1.3 SUBMITTALS

A. Shop Drawings: Show locker types, sizes, configurations, layout of groups of lockers, accessories and numbering plan.

B. Manufacturer's Literature and Data: Description of each product.

C. Samples: 6 inch square (150 mm2) samples in specified color(s).

### 1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.

B. Store in dry and protected location.

C. Do not open packages until contents are needed for installation, unless verification inspection is required.

### 1.5 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):

A1008/A1008M.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

## PART 2 - PRODUCTS

### 2.1 LOCKER TYPE AND ACCESSORIES

A. Freestanding (Attached), 1 tier high:

1. Base Style: 150 mm (6 inches) high.
2. Top Style: Sloped.
3. Locking Device: Locking handle for padlock.
4. Accessories: Number plate; rubber bumper.

**2.2 METAL LOCKER MATERIALS AND FABRICATION**

A. Fabricate lockers of mild, cold-rolled, leveled sheet steel, free from surface imperfections.

B. Bolts and Hooks: Zinc-plated or other rust-retarding treatment.

C. Body: Formed and flanged with stiffener ribs. Manufacturer's standard bolted construction. Fabricate from unperforated steel sheet as follows:

1. Tops, Bottoms, and Intermediate Dividers: 0.61 mm (0.024 inch) nominal thickness, with single bend at sides.
2. Backs and Sides: 0.61 mm (0.024 inch) nominal thickness, with full height, double flanged connections.

D. Frames: Formed channel shape; fabricated from 1.52 mm (0.060 inch) nominal thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Weld and grind flush. Form continuous, integral door strike full height on Vertical main frame.

E. Doors: One piece; fabricated from 1.52 mm (0.060 inch) nominal thickness steel sheet; formed into channel shape with double bend at vertical edges and with right angle single bend at horizontal edges.

1. Doors for lockers less than 381 mm (15 inches) wide may be fabricated from 1.21 mm (0.048 inch) nominal thickness steel sheet.
2. Door Style: Unperforated panel.
3. Concealed Vents: Slotted perforations in top and bottom horizontal return flanges of doors.

F. Hinges: Welded to door and attached to door frame with no fewer than two factory installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Continuous; manufacturer's standard, steel, full height.

G. Provide rubber silencers and other features to promote quiet operation.

H. Door Handle and Latch for Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

I. Finish edges smooth without burrs.

**2.3 ACCESSORIES**

A. Provide end panels, filler panels and individual sloped metal tops to close off openings.

B. Base: Continuous zee base; fabricated from 1.52 mm (0.060 inch) nominal thickness steel sheet.

1. Height 150 mm (6 inches).

C. Identification Plates: Provide a number plate for each locker door. Confirm with Owner acceptable numbering system and arrangement.

**2.4 FINISHES**

A. Finish: Manufacturer's standard baked enamel finish in color(s) as in F Scheduled on the Drawings.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Examine walls and floors with installer present for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

A. Install lockers secure, plumb, square and in line.

B. Anchor lockers with appropriate devices to suit materials encountered.

C. Bolt adjoining lockers together to provide rigid installation.

D. Install end panels, filler panels, sloped tops and bases to completely close off openings.

E. Adjust doors, hardware and other moving or operating parts to function smoothly and correctly.

F. Remove damaged or defective components and replace with new components or repair to the original condition.

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# SECTION 11 71 01
# MEDICAL WASHING AND STERILIZING EQUIPMENT

## PART 1 - GENERAL

### 1.1 DESCRIPTIONS

A. This section specifies Medical Reprocessing and Sterilization Equipment including washer disinfectors, cart washers, ultrasonic cleaners, automated endoscope re-processors, steam sterilizers, ethylene oxide (EtO) sterilizer/aerator combination units, ethylene oxide (EtO) abators, plasma sterilizers, ethylene oxide (EtO) monitoring stations, liquid chemical sterilizers, drying cabinets, detergent dispensing units, water treatment systems, steam guns, and endoscope pre-processing sinks.

B. Contractor shall prepare required permit application(s) and obtain a “Certificate of Operation” for all ethylene oxide sterilization/aerator equipment, abators, monitoring systems, and other ethylene oxide related components as required by the New York City Department of Environmental Protection (NYCDEP).

### 1.2 DEFINITIONS

A. Ultrasonic Cleaner: A mechanical system that uses sound waves, water and detergent to loosen soil from instruments. Both countertop and floor units are available.

B. Washer/Disinfector: An automated washing unit that uses high-temperature water and detergent to clean and high-level disinfect instruments and trays.

1. Cube Model – Single chamber washer/disinfector.
2. Tunnel Model – Multiple chamber washer/disinfector.

C. Cart Washer: An automated washing unit that uses high-temperature water and detergent to clean and high-level disinfect carts and equipment.

D. Endoscope Drying Cabinet: Freestanding cabinet used to dry endoscopes with forced, filtered air within the cabinet, as well as through the channels of the scopes.

E. Equipment Drying Cabinet: Freestanding cabinet used to dry equipment with forced, filtered air and variable temperature settings. There are single door and pass-thru units available.

F. Automated Endoscopic Re-Processor (AER): Automated washing unit that uses water and EPA-approved high level disinfectants to clean and high level disinfect immersible, flexible endoscopes.

G. Steam Sterilizer: A machine used to sterilize instruments and equipment by subjecting them to high-pressure steam up to 135 degrees C (275 degrees F). Sterilizers are available in both cart-loading and floor-loading models. They can be either freestanding or recessed, with single or double doors (pass-thru). Steam sterilizers are also known as autoclaves.

H. Ethylene-Oxide (EtO) Sterilizer/Aerator Combination: A machine that combines the sterilization and aeration process into one unit. Ethylene Oxide gas is used to sterilize heat-sensitive instruments and equipment by subjecting them to a temperature of up to 54 degrees C (130 degrees F), and an aeration cycle immediately follows the sterilization cycle. ETO sterilizers can be freestanding or recessed, with single doors. A dedicated exhaust system is required for Ethylene Oxide.

I. Ethylene Oxide (EtO) Disposal System (Abator): A machine used as a pollution-control device, that converts ethylene oxide gas exhausted from sterilizer/aerator units to CO2 and water vapor through a heated catalytic process.

J. Ethylene Oxide (EtO) Monitoring Station: A continuous monitoring device (Single point or multi-point system) used to detect Ethylene Oxide leakage into the room.

K. Gas Plasma Sterilizer: A machine that uses hydrogen peroxide gas plasma to sterilize heat-sensitive instruments and equipment. These sterilizers are available as either floor, cart, or counter-mounted.

L. Liquid Chemical Sterilizer: A machine that uses a low-temperature liquid chemical sterilant to process heat-sensitive rigid and flexible endoscopes.

M. Water Treatment System: A mechanical system for use with steam sterilizers, washer/disinfectors and cart washers, that decreases contaminates in the municipal water to reduce boiler scaling and instrument spotting.

N. Detergent Dispensing System: A mechanical system that dispenses measured doses of detergent or other chemicals directly to washer disinfectors and cart washers.

O. Steam Gun: Refer to Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.

P. Endoscope Pre-Processing Sink: Refer to Section 22 40 00, PLUMBING FIXTURES.

**1.3 RELATED WORK**

A. Section 22 11 00, FACILITY WATER DISTRIBUTION and Section 22 13 00, FACILITY SANITARY SEWERAGE: Plumbing Connections.

B. Section 22 40 00, PLUMBING FIXTURES.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

D. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING: Steam Connections.

E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Remote monitoring of the Steam Sterilizers and EtO Monitoring system.

F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Electrical Connections.

**1.4 PERFORMANCE REQUIREMENTS**

A. Equipment shall have built-in monitoring for timed cycles, and control devices for proper temperature and pressure. Equipment shall have a printer, either integrated or remote, for recording cycle time, temperature, and pressure.

B. Manufacturer safeguards must be provided with the equipment to protect the operator from harm during normal operation of the equipment.

**1.5 QUALITY CONTROL**

A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC, Article 1.3 Quality Assurance, Paragraph D “Products Criteria”.

B. Mechanical, electrical, and associated systems shall be safe, reliable, efficient, durable, easily and safely operable, maintainable, and accessible.

C. Standard Products: Material and equipment shall be the standard products of the selected manufacturer, and they should be regularly engaged in the manufacture of such products for at least three (3) years. The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three (3) years. However, digital electronics devices, software and systems such as controls, instruments, computer work stations, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three (3) years.

D. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

E. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

F. Nameplates: Nameplate bearing manufacturer’s name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

G. Installer Qualifications: Installer is authorized representative of sterilizer manufacturer and employs factory-trained personnel to install sterilizers. Installer is licensed as may be necessary by regulatory organizations.

H. Steam Sterilizers: Comply with the most current version of ANSI/AAMI ST8.

I. Ethylene-Oxide Sterilizers: Comply with the most current version of ANSI/AAMI ST24.

**1.6 SUBMITTALS**

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

B. Manufacturer’s Literature and Data: Include the following:
   1. Illustrations and descriptions of medical reprocessing equipment.
   2. Optional auxiliary equipment and controls.
   3. Catalog or model numbers for each component.
   4. Utility requirements.

C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.

D. Field Test Reports: Provide certification reports from accredited service technicians or installers.

E. Operating Instructions: Comply with requirements in specification Section 01 00 00, GENERAL REQUIREMENTS.

F. Furnish a copy of required “Certificate of Operation” from the NYCDEP for all ethylene oxide sterilization/aerator equipment, abators, monitoring systems, and other ethylene oxide related components; submit to the Resident Engineer.

**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 National Standards Institute/Association for the Advancement of Medical Instrumentation (ANSI/AAMI):
ST8-2008.....Hospital Steam Sterilizer, 3rd edition
ST24-1999 (R2009).....Automatic, General-Purpose Ethylene Oxide Sterilizers and Ethylene Oxide Sterilant Sources Intended for Use in Health Care Facilities

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06.....Metal Finishes Manual

**1.8 WARRANTY**

Comply with FAR clause 52.246-21 in all areas except for warranty period, which shall be two (2) years for all equipment.

**1.9 GUARANTEE PERIOD SERVICES**

A. Engage factory-trained authorized manufacturers' representatives to perform maintenance service on equipment during guarantee period.
   1. Maintenance Service:
      a. Inspection of equipment at regularly scheduled intervals as defined by the manufacturer.
      b. Testing, cleaning, adjusting, repairing, and furnishing and installing replacement components as required to maintain equipment in reliable working condition.
   2. Maintenance service does not include cleaning, adjusting, repairing, furnishing and installing replacement components required because of improper use.

**PART 2 - PRODUCTS**

**2.0 INDEX**

A. A1195 Counter, Cleanup, With 2 or 3 Sinks.
B. A5135 Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd.
C. A5210 Bracket, Television, Wall Mounted, w/Adjust Arm.
D. C0051M Stainless Steel Pegboard.
E. E0918M Cabinet, Endoscope Drying.
F. K1550 Brewer, Coffee, Auto, Elect, 3 Burner, Side/Side.

G. L2000 Purification System, Water.
H. M1803M Mount, Wall, FP Monit/Kbd/CPU.
I. M1803M1 Mount, Ceiling, FP Monit/Kbd/CPU.
J. M2020 Cabinet, Storage, Safety, Built-In, Vented.
K. S0395 Loading Car and Transfer Carriage, Large Chamber.
L. S0530 Sterilizer, Stm, VAC, 1DO, RCSD 1WLL.
M. S0960 Washer/Disinfector, STM, 2DO, RCSD 1WLL.
N. S2635 Cleaner, Ultrasonic, SNGL Chamber, CAB, F/S.
O. S2640 Cleaner, Ultrasonic, Console, DBL CHMBR, CAB, F/S.
P. S3185 Washer, Cart and Utensil, 2 DO, PIT MNTD, RCSD 2 WLL.
Q. S5500M Automated Endoscope Reprocessor.
R. S5500M1 Sterilizer/Aerator, EtO Gas.
S. S5500M2 Ultrasound Probe Reprocessor.
T. S5500M3 Ultrasound Probe Disinfector.
U. U1000 Abator, Ethylene Oxide.
V. U1002 Pass-Through Assembly.

**2.1 A1195 COUNTER, CLEANUP, WITH 3 SINKS**

A. Materials: Countertop shall be constructed of 300 series stainless steel. All welded construction, ground and blended to match finish. Unit shall be constructed of no thinner than No 14 gauge stainless steel on the top and no less than 18 gauge stainless steel in the basins. Front and 2 sides shall have an apron not less than 152 mm (6 inches) high of not less than 16 gauge stainless steel with corners welded, ground and blended to match finish.

B. Work Surface: Unit shall have three (3) basins not more than 304.8 mm (12 inches) deep and which are approximately 609.6 mm (24 inches) wide by 431.8 mm (17 inches) long. Basins shall be adjacent to one another with approximately 654.05 mm (25.75 inches) from center of drain to center of drain. Counter has work shelves on either side of outermost basin which slope to basins. Shelves shall be not less than 565.15 mm (22.25 inches) wide by 781.05 mm (30.75 inches) long.

C. Fixtures: Counter has not less than two (2) goose neck faucets. Faucets shall be designed to prevent from pouring directly into basin drain. Each faucet has a pre-rinse with a spray head which can provide continuous water flow and has a stainless steel braided hose with heavy duty chrome plated spring. Pre-rinse is free standing and does not require building support for stability. Counter has integral air gun

with standard 5 tip and hose. Counter has a computer monitor/keyboard/mouse mount on the far left-hand side attached to the backsplash. Mount is an articulating arm type that will not drift or sag and can support up to a 533.4 mm (21 inch) monitor.

D. Frame: Counter is freestanding and mounted on four stainless steel legs with enclosed set screw sockets and adjustable feet. Legs are braced to ensure stability. Counter is height adjustable through a cylinder and linear guide unit. Maximum lift load is not less than 1.5 N per cylinder with a lift length of not less than 300 mm (11.82 inches). Lift speed with electric motor is not less than 30 mm/s (1.18 inches/s). Lift motor is operated by a control pad located at the counter with not less than four (4) pre-set memory. Motor is concealed and protected and attached to counter. Counter feet have rubber adjustable levelers and floor anchor plates.

E. Soap Dispensing: Provide a remotely located, automatic soap concentrate dispensing station to provide liquid concentrate prewash, wash, or sterilant to each appropriate basin.

**2.2 COUNTER, CLEANUP, WITH 2 SINKS**

A. Materials: Countertop shall be constructed of 300 series stainless steel. All welded construction, ground and blended to match finish. Unit shall be constructed of no thinner than No 14 gauge stainless steel on the top and no less than 18 gauge stainless steel in the basins. Front, back and 2 sides shall have an apron not less than 6 inches high of not less than 16 gauge stainless steel with corners welded, ground and blended to match finish.

B. Work Surface: Unit shall have two (2) basins not more than 304.8 mm (12 inches) deep and which are approximately 609.6 mm (24 inches) wide by 431.8 mm (17 inches) long. Basins shall be adjacent to one another with approximately 654.05 mm (25.75 inches) from center of drain to center of drain. Counter shall extend beyond each basis to provide work surfaces on either side of outermost basin and slope to basins. Work surface area shall be not less than 565.15 mm (22.25 inches) wide by 781.05 mm (30.75 inches) long; with marine edges.

C. Fixtures: Counter has two (2) goose neck faucets. Faucets shall be designed to prevent from pouring directly into basin drain. Each faucet has a pre-rinse with a spray head which can provide continuous water flow and has a stainless steel braided hose with heavy duty

chrome plated spring. Pre-rinse is free standing and does not require building support for stability. Counter has integral air gun with standard 5 tip and hose. Counter has a computer monitor/keyboard/mouse mount on the far left-hand side attached to the backsplash. Mount is an articulating arm type that will not drift or sag and can support up to a 533.4 mm (21 inch) monitor.

D. Frame: Counter is freestanding and mounted on four stainless steel legs with enclosed set screw sockets and adjustable feet. Legs are braced to ensure stability. Fixed shelf below with notch to accommodate plumbing box for service connections in freestanding locations. Counter shall have floor anchor plates.

E. Soap Dispensing: Provide automatic soap concentrate dispensing station to provide liquid concentrate prewash, wash, or sterilant to each appropriate basin.

**2.3 A5135 SHELF, UTILITY W/ MOP/BROOM HOLDERS, SS, SURF MNTD**

A. Stainless steel with grip jaw cam mechanism securing five (5) mop or broom handles. Also includes hooks and storage shelf.

**2.4 A5210 BRACKET, TELEVISION, WALL MOUNTED, W/ADJUST ARM**

A. The wall mounted bracket shall be mounted where indicated on the construction drawings. The mount shall be coordinated with the television size at location.

1. Articulating arm mount style.
2. Universal design shall be width and height adjustable to fit VESA standard mounting hole patterns.
3. Tilt range from positive 15 degrees to negative 5 degrees.
4. Swivel range of 90 degrees.
5. Constructed of a corrosive resistant materials with a powder coat black finish.
6. Integrated cable management.
7. Tamper-resistant hardware.
8. Mount shall be capable of supporting not less than 41.0 kg (90 lbs).

**2.5 C0051M STAINLESS STEEL PEGBOARD**

A. Characteristics:

1. Stainless Steel Construction.
2. 2438 mm (96 inches) wide by 1057 mm (42 inches) tall.
3. 2,937 holes for pegs measuring 6 mm (1/4 inch in diameter spaced 25 mm (1 inch) on center.

4. 38 kg (85 lbs) weight.
5. Attaches to wall with at least four (4) stainless steel mounting clips.
6. Screws, anchors and wall must adequately support not less than 227 kg (500 lbs).

**2.6 E0918M CABINET, ENDOSCOPE DRYING**

A. Chamber:
   1. Interior: Painted steel.
   2. Capacity: Up to 8 Endoscopes.
B. Doors:
   1. Quantity: Single.
   2. Operation: Manual.
   3. Configuration: Side hinged.
C. Loading: Manual.
D. Heat Source: Electric:
   1. Cabinet Temperature: 65 to 70 degrees C (149 to 158 degrees F).
   2. Standard Drying Time: 0 - 120 minutes.
E. Cabinet Filtration: HEPA filtered air through chamber and internal endoscope channels.
F. Air Flow Monitoring: Constant.
G. Electrical Requirements: 120V.

**2.7 K1550 BREWER, COFFEE, AUTO, ELECT, 3 BURNER**

A. 12 Cup Automatic Coffee Brewer with (3) three lower burners.
B. Capacity: Brews 14.8 liters/hour (3.9 gallons/hour).
C. All Stainless Construction.
D. Hot water faucet.
E. Water Supply: Water plumbed with back-up pour over access.
F. Inline Quick Connect Water Filter:
   1. Capacity: approximately 345 cups of coffee.
   2. Particle reduction to 0.2 microns.
G. Electrical Requirement: 120 volt with line and plug attached.

**2.8 L2000 PURIFICATION SYSTEM, WATER**

A. Configuration: Free Standing.
B. Water Treatment Process:
   1. Pre-Filtration.
   2. Recirculation.
   3. Deionization.

4. Final Filtration.
5. Integral Graphic Screen.

C. Average Output: 250 liters (66 gallons) per day.

D. Electrical Requirements: 120V.

**2.9 M1803M MOUNT, WALL, FP MONIT/KBD/CPU**

A. Configuration: Wall Mounted.

B. Articulating Arm:

1. Aluminum alloy with plastic cover.
2. Color: White.
3. Extension:
   a. Monitor: 457 mm (18 inches).
   b. Keyboard: Up to 990 mm (39 inches).
4. Weight Capacity:
   a. Display: Up to 8.2 kg (18 lbs.).
   b. Keyboard/Mouse/Bar Code Scanner: 2.3 kg (5 lbs.)
5. Fluid motion adjustment.
6. Tension: Mechanically adjustable.
7. Rotation:
   a. Arm: 3 point telescoping.
   b. Monitor: 360 degrees.
8. Tilt:
   a. Display: 30 degrees
9. Keyboard/Mouse tray included.
10. Concealed cable management.
11. Mounting Pattern: VESA compliant: 75x75 to 100x100.

C. Computer Mount:

1. Quantity: Two per post.
2. Construction: All steel mechanically fastened to post.
3. Color: White.
4. Includes fasteners to lock holder’s width.
5. Capacity:
   a. Width: 50 – 200 mm (2 – 8 inches).
   b. Weight: 18 kg (40 lbs.).

**2.10 M1803M1 MOUNT, CEILING, FP MONIT/KBD/CPU**

A. Configuration: Multi-component ceiling mounted post and bracket system.

1. One post.

2. Two articulating arms with monitor mount and folding keyboard / mouse / barcode scanner.
3. Two computer harness.

B. Post:
1. Fixed, ceiling mounted.
2. Steel construction.
3. Integrated cable management.
4. Dimensions:
   a. Base: 400 x 350 mm (16 x 14 inches).
   b. Post: 2030 x 75 x 75 mm (80 x 3 x 3 inches).

C. Articulating Arm:
1. Aluminum alloy with plastic cover.
2. Color: White.
3. Extension:
   a. Monitor: 457 mm (18 inches).
   b. Keyboard: Up to 990 mm (39 inches).
4. Weight Capacity:
   a. Display: Up to 8.2 kg (18 lbs.).
   b. Keyboard/Mouse/Bar Code Scanner: 2.3 kg (5 lbs.).
5. Fluid motion adjustment.
6. Tension: Mechanically adjustable.
7. Rotation:
   a. Arm: 3 point telescoping.
   b. Monitor: 360 degrees.
8. Tilt:
   a. Display: 30 degrees.
9. Keyboard/Mouse tray included.
10. Concealed cable management.
11. Mounting Pattern: VESA compliant: 75x75 to 100x100.

D. Computer Mount:
1. Construction: All steel mechanically fastened to post.
2. Color: White.
3. Includes fasteners to lock holder’s width.
4. Capacity:
   a. Width: 50 – 200 mm (2 – 8 inches)
   b. Weight: 18 kg (40 lbs.)

**2.11 M2020 CABINET, STORAGE, SAFETY, BUILT-IN, VENTED**

A. Lined acid and flammable liquid storage cabinet. To include:
   1. Dimensions: approximately 1219 mm wide by 609 mm deep by 749 mm high (48 inches wide by 24 inches deep by 29.5 inches high). Field verify dimensions with adjacent casework.
   2. Double door cabinet with panel.
   3. Adjustable shelf.
   4. Venting option.

**2.12 S0395 LOADING CAR AND TRANSFER CARRIAGE, LARGE CHAMBER**

A. For use with JSN S0530 Vertical Sterilizer. Loading car and transfer carriage for use with sterilizers. Loading car is a welded. Transfer rack is constructed of a welded CRS or painted for corrosion protection frame. Loading car is secured to the transfer carriage by a locking mechanism. For loading and unloading vertical sterilizers and for transferring goods to and from processing areas.

**2.13 S0530 STERILIZER, STM, VAC, 1DO, RCSD, 1WLL, 24X36X60 CHAMBER**

A. Chamber:
   1. Interior: Stainless steel.
   2. Chamber Sizes: Medium 660 mm x 953 mm (26 inches x 37.5 inches).
   3. Chamber Pressure: up to 310 kPa (45 PSIG).
   4. Chamber Temperature: 110 to 135 degrees C (230 to 275 degrees F).
B. Doors:
   1. Quantity: Single.
   2. Operation: Manual.
   3. Configuration: Hinged door.
C. Standard Cycles: Vacuum.
D. Heat Source: Steam.
E. Loading: Manual.
F. Recorder: Integrated Printer.
G. Control Options: Integrated controls.
H. Installation Options: Floor mount.
I. Electrical Requirements: 480V.
J. Non-Vented.

**2.14 S0960M WASHER/DISINFECTOR, STM, 2DO, RCSD1WLL, 26X24X24 CHAM**

A. Cube Model:
   1. Chamber Interior: Stainless steel.

2. Doors:
   a. Quantity: Double (Pass-thru).
   b. Operation: Automatic.
3. Loading: Automatic.
4. Controls: Microprocessor.
5. Heat Source: Steam.
6. Electrical Requirements: 480V.
7. Standard Cycles: Pre-Wash, Wash Enzyme, Wash Detergent, Rinse, Thermal Rinse, Drying.
8. Overall Size: 1066 mm wide x 787 mm long x 2032 mm high (42 inches wide x 31 inches long x 80 inches high).
9. Chamber Size: 673 mm wide x 666 mm long x 660 mm high (26.5 inches wide x 26.25 inches long x 26 inches high).
10. Non-Vented.

**2.15 S2635 CLEANER, ULTRASONIC, SNGL CHAMBER, CAB, F/S**

A. Floor Model:

B. Description: Designed to thoroughly clean surgical instruments and da Vinci accessories prior to disinfection and sterilization.
   1. Chamber:
      a. Single Chamber.
      b. Interior: Stainless steel.
      c. Tank capacity: 64 liters (17 gallons).
      d. Stainless Steel Construction.
   2. Doors:
      a. Quantity: Single.
      b. Operation: Automatic open.
   3. Loading: Manual.
   4. Touch Screen Control:
      a. Open lid.
      b. Select cycle.
      c. Start, pause and monitor cycles.
   5. Seismic tie-down.
   6. 10 port flush kit with brackets.
   7. Intuitive Surgical da Vinci Instrument tray.
   8. Intuitive Surgical da Vinci flush kit replacement hoses.
   9. Heat Source: Electric.
   10. Electrical Requirements: 208V, single phase.

**2.16 S2640 CLEANER, ULTRASONIC, CONSOLE, DBL CHMBR, CAB, F/S**

A. Floor Model:

1. Chamber:

a. Double Chamber.

b. Interior: Stainless steel.

c. Tank capacity: 41.6 to 75.7 liters (11 to 20 gallons).

2. Doors:

a. Quantity: Single.

b. Operation: Automatic.

3. Loading: Manual.

4. Heat Source: Electric.

5. Temperature:

a. Solution Tank: 37 to 48 degrees C (100 to 120 degrees F).

6. Electrical Requirements: 240V.

**2.17 S3185 WASHER, CART AND UTENSIL, 2 DO, PIT MNTD, RCSD 2 WLL**

A. Interior: Stainless steel.

1. Chamber Capacity: 3.8 to 6.82 cubic meters (134 to 241 cu.ft.).

B. Doors:

1. Quantity: Single (Pass-thru).

2. Operation: Automatic.

C. Controls: Microprocessor.

D. Heat Source: Steam.

E. Electrical Requirements: 480V.

F. Standard Cycles: Wash, Thermal Disinfection Rinse, Dry.

G. Installation Options: Pit mount.

H. Temperature:

1. Wash Cycle: 48.9 to 82.2 degrees C (120 to 180 degrees F).

2. Rinse Cycle: 82.2 to 90 degrees C (180 to 194 degrees F).

I. Loading: Manual.

J. Non-Vented.

**2.18 S5500M AUTOMATIC ENDOSCOPE RE-PROCESSOR (AER)**

A. Configuration: Free Standing.

B. Chamber:

1. Chamber Quantity: Double, Independent.

2. Chamber Processing Capacity: 1 scope per Basin.

3. Overall Size: 914 mm wide x 533 mm long x 1168 mm high (36 inches wide x 21 inches long x 46 inches high).

C. Standard Cycle:
   1. Time: 30 minutes.
D. Printer: Remote Printer.
E. Water Pressure: 276 kPa (40 PSI).
F. Electrical Requirements: 208V.
G. Printer Electrical Requirements: 110V.
H. Standard Cycles: Leak Test, Pre-Rinse, Wash, Rinse, Disinfect, Alcohol Rinse, Leak Test, Forced Air Dry.
I. Heated Disinfectant Reservoirs.
J. Air Compressor: Integral.
K. Printer: Integral.
L. Filters: Air, (3) Three stage Water, Disinfectant.

**2.19 S5500M1 STERILIZER/AERATOR, ETO GAS**

A. Chamber:
   1. Interior: Anodized Aluminum.
   2. Size: 223 liters (7.9 cu.ft).
B. Cycle Time:
   1. Exposure: 0 to 99 hours.
   2. Aeration: 0 to 99 hours.
   3. Chamber Pressure:  345-1034 kPa (50-150 psi).
   4. Warm Sterilization Temperature: 55 degrees C (131 degrees F).
   5. Cold Sterilization Temperature: 37 degrees C (98.6 degrees F).
   6. Warm Aeration Temperature: 54 degrees C (130 degrees F).
   7. Cold Aeration Temperature: 38 degrees C (100 degrees F).
C. Doors:
   1. Quantity: Single.
   2. Operation: Manual.
D. Recorder: Integrated Printer.
E. Installation Options: Recessed.
F. Electrical Requirements: 220V.
G. Vent Outlet: Ethylene oxide vent pipe connection for vent pipe connection to abator.
H. Sterilant Delivery System:  Single-Use Gas cartridge.

**2.20 S5500M2 ULTRASOUND PROBE REPROCESSOR**

A. Configuration: Free Standing.
B. Chamber:
   1. Basin Quantity: Single.

2. Chamber Processing Capacity: 1 per Basin.
3. Overall Size: 94 mm wide x 94 m long x 133 mm high (13.6 inches wide x 13.6 inches long x 19.3 inches high).

C. Standard Cycle:
1. Time: 7 minutes.

D. Cycle Verification: Integral Screen.

E. System Electrical Requirements: 120V.

**2.21 S5500M3 ULTRASOUND PROBE DISINFECTOR**

A. Configuration: Wall Mounted.

B. Chamber:
1. Basin Quantity: Double.
2. Chamber Processing Capacity: 1 per Basin.
3. Overall Size: 610 mm wide x 203 mm long x 1118 mm high (24 inches wide x 8 inches long x 44 inches high).

C. Standard Cycle:
1. Time: 17 minutes.

D. Cycle Verification: Integral Screen.

E. Printer: Integral Printer.

F. System Electrical Requirements: 120V.

**2.22 U1000 ABATOR, ETHYLENE-OXIDE**

A. System Components:
1. Catalytic cell.
2. Heater.
3. Blower (Fan): 230V.
4. Prefilter.
5. Interconnection Kit: Links abator to ethylene-oxide sterilizer.
6. Construction: Stainless Steel.
7. Electrical Requirements: 220V.

B. Vent Accessories:
1. Inlet Vent: Ethylene oxide vent pipe connection for vent pipe connection to sterilizer.
2. Outlet Vent: Exhaust discharge connection. Provide 3-way blender exhaust discharge fitting with exhaust duct connection to mix high temperature abator discharge with room air for low temperature abator exhaust.
3. Auxiliary Vent: Ethylene oxide emergency vent pipe connection for vent pipe connection to outdoors.

**2.23 U1002 PASS-THROUGH ASSEMBLY**

A. Provide satin finished type 304 stainless steel 18 gauge, approximately 914 mm (36 inches) high by 914 mm (36 inches) wide by 914 mm (36 inches) deep specimen pass-through cabinet. Adjustable flange and trim shall be 53 mm (1 inch) wide and 6.5 mm (1/4-inch) square return to wall. Adjustable flange shall provide an installation range of 51 mm (2 inches) to 140 mm (5-1/2 inches). Doors shall be attached to edge of unit with full length stainless steel piano hinge and closed with spring tensioned interlocking mechanism to prevent both doors from simultaneous opening; 6.5 mm (1/4-inch) clear acrylic window. Removable stainless steel drip tray shall be provided at bottom of cabinet.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Install sterilizers according to manufacturer's written instructions.

B. Coordinate installation with related mechanical and electrical work. Provide cutouts and openings for plumbing and electrical work as indicated or as required by trades involved.

**3.2 TESTS**

A. Field test installed equipment after water and steam systems are pressurized for proper operation.

1. Operate each unit for six hours through repeated full cycles. During and after testing, there shall be no evidence of leaks, overheating, electrical failure, or other symptoms of failure.
2. For units that fail testing, make adjustments and corrections to installation, or replace equipment, and repeat tests until equipment complies with requirements.

**3.3 PROTECTING AND CLEANING**

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

A. Instruct personnel and transmit operating instructions in accordance with requirements in specification Section 01 00 00, GENERAL REQUIREMENTS.

B. Training must be provided by the manufacturer or installer.

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# SECTION 12 24 21
# LIGHTPROOF SHADES

## PART 1 - GENERAL

### 1.1 DESCRIPTION

Provide lightproof shades where indicated.

### 1.2 SUBMITTALS

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

B. Manufacturers' Literature and Data: Showing details of construction and hardware, and plans with locations for Lightproof Shades.

### 1.3 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. Federal Specifications (Fed. Spec.):

A-A-59517.....Cloth, Coated or Laminated, Polyvinylchloride (Artificial Leather)

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Shade Cloth: Fabricate for a crackproof and fadeproof material that will remain soft and pliable at all times under temperature changes. Shade cloth shall conform to fire resistant requirement of Fed. Spec. A-A-59517, and shall be same color on both sides.

B. Cords for Shades: No. 4 braided nylon, or No. 4 1/2 braided cotton having not less than 80 Kg (175 pounds) breaking strength.

C. Fastenings: Zinc-coated or cadmium plated metal, aluminum or stainless steel fastenings of proper length and type. Except as otherwise specified, fastenings for use with various structural materials shall be as follows:

| **Type of Fastening** | **Structural Material** |
|---|---|
| Tap Screw | Metal |
| Case-hardened, self-tapping screw | Solid masonry, Sheet metal |
| Toggle bolts | Hollow blocks, wallboard plaster |

### 2.3 FABRICATION

A. Lightproof shades shall be metal head housing, continuous metal jamb and head anchor section, operating bars, and shall be complete with roller

assembly, one piece lightproof shade cloth, and metal disappearing type horizontal braces (two each shade).

B. Rollers shall be of aluminum or stainless steel of sufficient diameter to support the shade, and provided with spindles, bearings and coil springs. Provide rollers with a groove and metal spline with aluminum, or stainless steel machine screws spaced not over nine inches on centers, for attaching the shade cloth.

C. Shades not finished with a selvage shall have vertical edges bound or hemmed to prevent raveling. Sewing shall be double or triple stitched, using a high-grade thread. Make needle holes lightproof by applying a suitable filler.

D. Stiffen the shade by transverse steel bars of size and weight to hold the shade in the channel guides. Space bars approximately 450 mm (18 inches) on centers and conceal in pockets in the shade. Fit bottom edge of the shade with a steel operating bar designed to engage the sill channel of the light trap. Paint bars with flat black enamel.

E. Cords: Fit operating bar with pull cord.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

Install lightproof shades level at a height that will permit proper operation of the shades, and prevent outside light from infiltrating into the room. Shades shall not be installed until after the room painting and finishing operations are complete.

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# SECTION 12 31 00
# MANUFACTURED METAL CASEWORK AND WALL SHELVING

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies metal casework and related accessories, full height cabinets and adjustable wall shelving.

### 1.2 QUALITY ASSURANCE

A. Approval by Contracting Officer of proposed manufacturer, or suppliers, will be based upon submission by Contractor certification that, manufacturer regularly and presently manufactures casework specified as one of their principal products.

B. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.

C. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.

### 1.3 SUBMITTALS

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

B. Certificates:

1. Manufacturer's Certificate of qualifications specified and finish on casework and shelving.
2. Contractor's Certificate of installer’s qualifications specified.
3. Safety glass meets requirements of ANSI Standard Z97.1.

C. Manufacturer's Literature and Data:

1. Brochures showing name and address of manufacturer, and catalog or model number of each item incorporated into the work.
2. Manufacturer's illustration and detailed description.
3. List of deviations from contract specifications.
4. Locks, each kind.

D. Shop Drawings (1/2 Full Scale):

1. Showing details of casework construction, including kinds of materials and finish, hardware, accessories and relation to finish of adjacent construction, including specially fabricated items or components.
2. Fastenings and method of installation.
3. Location of service connections and access.

E. Samples:

1. Metal plate, 150 mm (6 inch) square, showing chemical resistant finish, in each color.

2. One complete cabinet assembly with glazed swinging door and hardware.
3. Cabinet for subsequent installation may be submitted for above requirements.

**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):

A36/A36M-08.....Carbon Structural Steel

A167-99(R 2009).....Stainless and Heat-Resisting Chromium Steel Plate Sheet and Strip

A283/A283M-03(R 2007)...Low and Intermediate Tensile Strength Carbon Steel Plates

A568/A568M-09.....Steel, Sheet, Carbon and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements

A794/A794M-09.....Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16% Maximum to 0.25% Maximum) Cold Rolled

B456-03(R2009).....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C1036-06.....Flat Glass

C. American National Standard Institute:

Z97.1-09.....Safety Glazing Material used In Buildings

D. Builders Hardware Manufacturers Association (BHMA):

A156.1-06.....Butts and Hinges

A156.9-10.....Cabinet Hardware

A156.5-10.....Auxiliary Locks and Associated Products

A156.11-10.....Cabinet Locks

A156.16-02.....Auxiliary Hardware

E. American Welding Society (AWS):

D1.1-10.....Structural Welding Code Steel

D1.3-08.....Structural Welding Code Sheet Steel

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-505-06 Series...Metal Finishes Manual

G. U.S. Department of Commerce, Product Standard (PS):

PS 1-95.....Construction and Industrial Plywood

H. Federal Specifications (Fed. Spec.):

FF-N-836D.....Nut, Square, Hexagon Cap, Slotted, Castle Knurled, Welding and Single Ball Seat

A-A-55615.....Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Sheet Steel:
   1. ASTM A794, cold rolled, Class 1 finish, stretcher leveled.
   2. Other types of cold rolled steel meeting requirements of ASTM A568 may be used for concealed parts.

B. Structural Steel: ASTM A283 or ASTM A36.

C. Stainless Steel: ASTM A167, Type 302B.

D. Glass:
   1. ASTM C1036 Type I, Class 1, Quality q3,
   2. Laminated Glass for Doors: Fabricate of two sheets of 3 mm (1/8 inch) thick clear glass, laminated together with a 1.5 mm (0.060 inch) thick vinyl interlayer, to a total overall thickness of 8 mm (5/16 inch).

E. Glazing Cushions:
   1. Channel shaped, of rubber, vinyl or polyethylene plastic, with vertical flanges not less than 2 mm (3/32 inch) thick and horizontal web 3 mm (1/8 inch) thick.
   2. Flanges may have bulbous terminals above the glazing heads or terminate flush with top of beads.

F. Fasteners:
   1. Exposed to view, chrome plated steel or stainless steel, or finished to match adjacent surface.
   2. Use round head or countersunk fasteners where exposed in cabinets.
   3. Expansion Bolts: Fed Spec. A-A-55615. Do not use lead or plastic shields.
   4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
   5. Sex Bolts: Capable of supporting twice the load.

**2.2 MANUFACTURED PRODUCTS**

A. When two or more units are required, use products of one manufacturer.

B. Manufacturer of equipment assemblies, which include components made by other, shall assume complete responsibility for the final assembled unit.

C. Constituent parts which are alike, use products of a single manufacturer.

**2.3 CASEWORK FABRICATION**

A. General:

1. Welding: Comply with AWS Standards.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.
3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

| | |
|---|---|
| 0.89 mm (0.035 inch) (20 gage) | Drawer fronts, backs, bodies, closure plates or scribe and filler strips less than 75 mm (3 inches) wide, sloping top, shelf reinforcement channel and shelves. Casework soffits and ceilings under sloping tops |
| 1.20 mm (0.047 inch) (18 gage) | Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (3 inches) or more. Door panels, glazed. Cross rails of units. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets. |
| 3 mm (0.12 inch) (11 gage) | Reinforcement for hinge reinforcement inside doors and cabinets. |

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front, include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of walls units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets.
7. Provide finish panel on exposed cabinet backs.
8. Do not use screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, and where casework is required to be fastened side-to-side.
9. Fabricate casework with finished end panels.
10. Provide reinforcing for hardware.
11. Size Dimensions:
    a. Used dimensions shown or specified within tolerances specified.
    b. Tolerance:
        1) Depth: 325 mm (13 inches) in lieu of 300 mm (12 inches), 450 mm (18 inches) in lieu of 400 mm (16 inches).

2) Width: Minus 25 mm (1 inch).
3) Height: 25 mm (1 inch) plus for floor standing cabinets, excluding base and sloping tops..
4) Manufacturer's tolerance for the same length, depth or height: Not to exceed 1.58 mm (0.0625 inches).

D. Base Pedestals:
1. Provide adjustable leveling bolts accessible through stainless steel plugs, or notch in the base concealed when resilient base is applied.
2. Except where flush metal base is shown, provide toe space at front recessed 75 mm (3 inches).

E. Doors:
1. Hollow metal type, glazed doors not less than 16 mm (5/8 inch) thick.
3. Fabricate glazed metal doors with reinforced frame and construct either from one piece of steel, or have separate stiles and rails mitered and welded at corners, and welds ground smooth.
   a. Secure removable glazing members with screws to back of doors.
   b. Install glass in rubber or plastic glazing channels.
4. Provide sheet steel hinge reinforcement inside doors.

F. Sloping Tops:
1. Provide sloping tops for casework where shown.
2. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.
3. Omit sloping tops or filler plates whenever ceiling material is turned down and furred-in at face of casework.
4. Provide exposed ends of sloping tops with flush closures.
5. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.

G. Shelves:
1. Capable of supporting an evenly distributed minimum load of 122 kg/m$^2$ (25 pounds per square foot) without visible distortion.
2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
3. For shelves over 1050 mm (42 inches) in length and over 300 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1-1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
4. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.

**2.4 ADJUSTABLE WALL SHELVING**

A. Post-Type Wall Mount:
   1. Posts: Wall mounted stainless steel posts, grooved at 25 mm (1 inch) increments for shelf adjustment.
   2. Wall Mounting Brackets: Stainless steel, provide two end brackets and one intermediate bracket.

B. Stainless Steel Wall Shelves:
   1. Solid: 1.3 mm (18 gauge), Type 304 flat stainless steel sheet with 3.2 mm (1/8 inch) raised edge.

C. Sizes and quantities as indicated on Drawings.

**2.5 HARDWARE**

A. Factory installed.

B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.

C. Cabinet Locks:
   1. Where locks are shown.
   2. Locked pair of hinged door over 900 mm (36 inches) high:
      a. ANSI/BHMA A156.5, similar to E0261, Key one side.
      b. On active leaf use three-point locking device, consisting of two steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
      c. On inactive leaf use dummy lever of same design.
      d. Provide keeper holes for locking device rods and cam.
   3. Door: ANSI/BHMA A156.11 cam locks.
      a. Drawer and Hinged Door up to 900 mm (36 inches) high: E07261.
      b. Pin-tumbler, cylinder type lock with not less than four pins. Disc tumbler lock "duo A" with brass working parts and case, as manufactured by Illinois Lock Company are acceptable.
      c. Sliding Door: E07161.
   4. Key locks differently for each type casework and master key for each service, such as Morgue Units.
      a. Provide two keys per lock.
      c. Provide six master keys per service.
   5. Marking of Locks and Keys:
      a. Name of manufacturer, or trademark which can readily be identified legibly marked on each lock and key change number marked on exposed face of lock.
      b. Key change numbers stamped on keys.
      c. Key change numbers to provide sufficient information for manufacturer to replace key.

D. Cabinet Hardware: ANSI BHMA A156.9.
   1. Door Pulls: B02011.
   2. Door in seismic zones: B03352.
      a. Do not provide thumb latch on doors equipped with three point locking device.
      b. Use lever operated two point latching device on paired doors over 900 mm (36 inches) high if three point locking or latching device is not used.
   3. Cabinet Door Catch:
      a. Install at bottom of wall cabinets, top of base cabinets and top and bottom of full height cabinet doors over 1200 mm (48 inches).
      b. Omit on doors with locks.
   4. Butt Hinges:
      a. B01351, minimum 1.8 mm (0.072 inch) thick chrome plated steel leaves.
      b. Minimum 3.5 mm (0.139 inch) diameter stainless steel pins.
      c. Full mortise type, five knuckle design with 63 mm (2-1/2 inch) high leaves and hospital type tips.
      d. Two hinges per door except use three hinges on doors 1200 mm (48 inches) and more in height. Use stainless steel leaves for tilting bin doors.
      f. Do not weld hinges to doors or cabinets.
   5. Shelf Supports:
      a. install in casework where adjustable shelves are noted.
      b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
      c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.
   6. Auxiliary Hardware: ANSI A156.16.
   7. Door silencers: LO3011 or LO3031.
      a. Install two rubber bumpers each door.
      b. Silencers set near top and bottom of jamb.

**2.6 METAL FINISHES**

A. Comply with NAAMM 500 series and as specified.
B. Stainless Steel: Mechanical finish No. 4 on sheet except No. 7 on tubing.

**PART 3 - EXECUTION**

**3.1 COORDINATION**

A. Before installing casework and wall shelving, verify wall and floor surfaces in area of casework placement and shelving assembly have been finished.

B. Verify reinforcement of walls and partitions for support and anchorage of casework and wall shelving.

**3.2 FASTENINGS AND ANCHORAGE**

A. Do not anchor to wood ground strips.

B. Provide hat shape metal spacers where fasteners span gaps or spaces.

C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.

D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.

E. Space fastening devices 300 mm (12 inches) on center with minimum of three fasteners in 900 or 1200 mm (3 or 4 foot) unit width.

F. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools.

G. Where units abut side-to-side anchor together at top and bottom of sides at front and back and to back wall.

H. Where type, size, or spacing of fastenings is not shown or specified, show on shop drawings proposed fastenings and method of installation.

**3.3 FILLER PLATES**

A. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.

1. Secure filler plates to casework top members, unless shown otherwise.
2. Secure filler plates more than 150 mm (6 inches) in width top edge to a continuous 25 by 25 mm (1 by 1 inch) 0.889 mm thick steel formed steel angle with screws.
3. Anchor angle to ceiling with toggle bolts.

**3.4 CABINETS**

A. Install in available space; arranged for safe and convenient operation and maintenance.

B. Align cabinets for flush joints except where shown otherwise.

C. Install cabinets level in alignment.

D. Plug Buttons:

1. Install plug buttons in predrilled or prepunched perforations not used.

2. Use chromium plate plug buttons or buttons finish to match adjacent surfaces.

E. Cabinets 6D: Ground to nearest cold water pipe in accordance with NFPA, Underwriters Laboratories, Inc., or other nationally recognized approved ground specified system.

**3.5 PROTECTION TO FIXTURES, MATERIALS, AND EQUIPMENT**

A. Tightly cover and protect cabinets and wall shelving against dirt, water chemical or mechanical injury.

B. Thoroughly clean interior and exterior surfaces of cabinets and wall shelving, at completion of all work.

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# SECTION 12 36 00
# COUNTERTOPS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies casework countertops.

### 1.2 RELATED WORK

A. Integral accessories: Section 22 40 00, PLUMBING FIXTURES.

### 1.3 SUBMITTALS

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

B. Shop Drawings:

1. Show dimensions, sections, insert template cutouts, and method of assembly.
2. Show details of construction at 1/2 scale.

C. Samples:

1. 150 mm (6 inch) square samples each top.
2. Front edge, back splash, end splash and core with surface material and booking.

### 1.4 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. Composite Panel Association (CPA):
A208.1-09.....Particleboard

C. American Society for Testing and Materials (ASTM):
D256-10.....Pendulum Impact Resistance of Plastic
D570-98(R2005).....Water Absorption of Plastics
D638-10.....Tensile Properties of Plastics
D785-08.....Rockwell Hardness of Plastics and Electrical Insulating Materials

D. U.S. Department of Commerce, Product Standards (PS):
PS 1-95.....Construction and Industrial Plywood

E. National Electrical Manufacturers Association (NEMA):
LD 3-05.....High Pressure Decorative Laminates

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Solid Polymer Material:

1. Filled Methyl Methacrylic Polymer.

2. Performance properties required:

| Property | Result | Test |
|---|---|---|
| Elongation | 0.3% min. | ASTM D638 |
| Hardness | 90 Rockwell M | ASTM D785 |
| Gloss ($60^0$ Gordon) | 5-20 | NEMA LD3.1 |
| Color stability | No change | NEMA LD3 except 200 hour |
| Abrasion resistance | No loss of pattern<br>Max wear depth 0.0762 mm (0.003 in) - 10000 cycles | NEMA LD3 |
| Water absorption weight (5 max) | 24 hours 0.9 | ASTM D-570 |
| Izod impact | 14 N·m/m<br>(0.25 ft-lb/in) | ASTM D256<br>(Method A) |
| Impact resistance | No fracture | NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball |
| Boiling water surface resistance | No visible change | NEMA LD3 |
| High temperature resistance | Slight surface dulling | NEMA LD3 |

3. Cast into sheet form.
4. Color throughout with subtle veining through thickness.
5. Joint adhesive and sealer: Manufacturer’s silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
6. Bio-based products will be preferred.

**2.2 SINKS**

A. Material as specified in Division 22, PLUMBING.

**2.3 TRAPS AND FITTINGS**

A. Material as specified in Division 22, PLUMBING.

**2.4 WATER FAUCETS**

A. Material as specified in Division 22, PLUMBING.

**2.5 COUNTERTOPS**

A. Fabricate in largest sections practicable.
B. Fabricate with joints flush on top surface.
C. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (1 inch) except where against walls or cabinets.
D. Fabricate with end splashes where against walls or cabinets.
E. Splash Backs and End Splashes:
   1. Not less than 19 mm (3/4 inch) thick.
   2. Height 100 mm (4 inches) unless noted otherwise.

3. Heights where fixtures or outlets occur: Not less than 150 mm (6 inches) unless noted otherwise.
4. Fabricate splash back in maximum lengths practical of the same material.

F. Methyl Methacrylic Polymer Tops:
1. Fabricate countertop of methyl methacrylic polymer cast sheet, 19 mm (3/4 inch) thick.
2. Fabricate back splash and end splash to height shown.
3. Fabricate skirt to depth shown.
4. Fabricate with marine edge where sinks occur.
5. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
6. Join pieces with adhesive sealant.
7. Cut out countertop for lavatories, plumbing trim.
8. Provide concealed fasteners and epoxy cement for anchorage of sinks to countertop.

**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 rails of cabinets as specified in manufacturer’s written instructions and recommendations.
1. Where type, size or spacing of attachment/fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.

C. Sinks:
1. Obtain sink and faucet templates from Division 22 contractor to guide countertop cutouts.

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

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. Provide seismic restraint in accordance with the requirements of this section in order to maintain the integrity of non-structural components of the building so that they remain safe and functional in case of seismic event.

B. Definitions: Non-structural building components are components or systems that are not part of the building's structural system whether inside or outside, above or below grade. Non-structural components of buildings include:

1. Architectural Elements: Facades that are not part of the structural system and its shear resistant elements; glazing; nonbearing partitions; suspended ceilings; cabinets; lockers; bookshelves; medical equipment; and storage racks.
2. Electrical Elements: Power and lighting systems; substations; switchgear and switchboards; auxiliary engine-generator sets; transfer switches; motor control centers; motor generators; selector and controller panels; fire protection and alarm systems; special life support systems; and telephone and communication systems.
3. Mechanical Elements: Heating, ventilating, and air-conditioning systems; medical gas systems; plumbing systems; sprinkler systems; pneumatic systems; boiler equipment and components.
4. Transportation Elements: Mechanical, electrical and structural elements for transport systems (i.e., cartlifts).

### 1.2 RELATED WORK

A. Section 01 41 50, SEISMIC CONTROL REQUIREMENTS.
B. Section 01 41 60, WIND LOAD DESIGN CRITERIA.
C. Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
D. Section 08 80 00, GLAZING.
E. Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
F. Section 09 29 00, GYPSUM BOARD.
G. Section 10 21 13, TOILET COMPARTMENTS.
H. Section 10 51 31, METAL LOCKERS.
I. Section 12 31 00, MANUFACTURED METAL CASEWORK.
J. Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS.
K. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
L. Section 22 13 00, FACILITY SANITARY AND VENT PIPING.
M. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

N. Section 23 21 13, HYDRONIC PIPING
O. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING
P. Section 23 23 00, REFRIGERATION PIPING.
Q. Section 23 31 00, HVAC DUCTS AND CASINGS.
R. Section 23 36 00, AIR TERMINAL UNITS.
S. Section 23 37 00, AIR OUTLETS AND INLETS.
T. Section 23 82 00, CONVECTION HEATING AND COOLING UNITS.
U. Section 26 24 16, PANELBOARDS.
V. Section 26 51 00, INTERIOR LIGHTING.

**1.3 QUALITY CONTROL**

A. Shop-Drawing Preparation:
   1. Have seismic-force-restraint shop drawings and calculations prepared by a professional structural engineer experienced in the area of seismic force restraints. The professional structural engineer shall be registered in the state where the project is located.
   2. Submit design tables and information used for the design-force levels, stamped and signed by a professional structural engineer registered in the State where project is located.
B. Coordination:
   1. Do not install seismic restraints until seismic restraint submittals are approved by the Resident Engineer.
   2. Coordinate and install trapezes or other multi-pipe hanger systems prior to pipe installation.
C. Seismic Certification:
   1. Permanent equipment and components are to have Special Seismic Certification in accordance with requirements of section 13.2.2 of ASCE 7 except for equipment that are considered rugged as listed in section 2.2 OSHPD code application notice CAN No. 2-1708A.5, and shall comply with section 13.2.6 of ASCE 7.

**1.4 SUBMITTALS**

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

B. Submit prior to installation, a coordinated set of bracing drawings for seismic protection of piping, with data identifying the various support-to-structure connections and seismic bracing structural connections, include:
   1. Single-line piping diagrams on a floor-by-floor basis. Show all suspended piping for a given floor on the same plain.
   2. Type of pipe (Copper, steel, cast iron, insulated, non-insulated, etc.).
   3. Pipe contents.
   4. Structural framing.
   5. Location of all gravity load pipe supports and spacing requirements.
   6. Numerical value of gravity load reactions.
   7. Location of all seismic bracing.
   8. Numerical value of applied seismic brace loads.
   9. Type of connection (Vertical support, vertical support with seismic brace etc.).
   10. Seismic brace reaction type (tension or compression): Details illustrating all support and bracing components, methods of connections, and specific anchors to be used.

C. Submit prior to installation, bracing drawings for seismic protection of suspended ductwork and suspended electrical and communication cables, include:
   1. Details illustrating all support and bracing components, methods of connection, and specific anchors to be used.
   2. Numerical value of applied gravity and seismic loads and seismic loads acting on support and bracing components.
   3. Maximum spacing of hangers and bracing.
   4. Seal of registered structural engineer responsible for design.

D. Submit design calculations prepared and sealed by the registered structural engineer specified above in paragraph 1.3A.

E. Submit for concrete anchors, the appropriate ICBC evaluation reports, OSHPD pre-approvals, or lab test reports verifying compliance with OSHPD Interpretation of Regulations 28-6.

**1.5 APPLICABLE PUBLICATIONS**

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

B. American Concrete Institute (ACI):
355.2-07.....Qualification for Post-Installed Mechanical Anchors in Concrete and Commentary

C. American Institute of Steel Construction (AISC):
Load and Resistance Factor Design, Volume 1, Third Edition

D. American Society for Testing and Materials (ASTM):
A36/A36M-12.....Standard Specification for Carbon Structural Steel
A53/A53M-12.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A307-12.....Standard Specification for Carbon Steel Bolts, Studs and Threaded Rod 60000 PSI Tensile Strength
A325-10e1.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A490-12.....Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
A500/A500M-13.....Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A501-07.....Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
A615/A615M-13.....Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A992/A992M-11.....Standard Specification for Structural Steel Shapes
E488/E488M-10.....Standard Test Method for Strength of Anchors in Concrete Element

E. American Society of Civil Engineers (ASCE 7) Latest Edition.

F. International Building Code (IBC) Latest Edition.

G. VA Seismic Design Requirements, H-18-8, August 2013.

H. National Uniform Seismic Installation Guidelines (NUSIG).

I. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
Seismic Restraint Manual - Guidelines for Mechanical Systems, 1998 Edition and Addendum

**1.6 REGULATORY REQUIREMENT**

A. IBC 2009.

B. Exceptions: The seismic restraint of the following items may be omitted:

1. Equipment weighing less than 400 pounds, which is supported directly on the floor or roof.
2. Equipment weighing less than 20 pounds, which is suspended from the roof or floor or hung from a wall.
3. Gas and medical piping less than 25 mm (1 inch) inside diameter.
4. Piping in boiler plants and equipment rooms less than 32 mm (1-1/4 inches) inside diameter.
5. All other piping less than 65 mm (2-1/2 inches) inside diameter, except for automatic fire suppression systems.
6. All piping suspended by individual hangers, 300 mm (12 inches) or less in length from the top of pipe to the bottom of the support for the hanger.
7. All electrical conduits, less than 65 mm (2-1/2 inches) inside diameter.
8. All rectangular air handling ducts less than 1828 square mm (6 square feet) in cross sectional area.
9. All round air handling ducts less than 711 mm (28 inches) in diameter.
10. All ducts suspended by hangers 12 inches or less in length from the top of the duct to the bottom of support for the hanger.

**PART 2 – PRODUCTS**

**2.1 STEEL**

A. Structural Steel: ASTM A36/A36M and A992.

B. Structural Tubing: ASTM A500, Grade B.

C. Structural Tubing: ASTM A501.

D. Steel Pipe: ASTM A53/A53M, Grade B.

E. Bolts & Nuts: ASTM A307, A325, A490.

**2.2 CAST-IN-PLACE CONCRETE**

A. Concrete: 28 day strength, f’c = 30 MPa (4,000 psi).

B. Reinforcing Steel: ASTM A615/615M Grade 60 deformed.

## PART 3 – EXECUTION

### 3.1 CONSTRUCTION, GENERAL

A. Provide equipment supports and anchoring devices to withstand the seismic design forces, so that when seismic design forces are applied, the equipment cannot displace, overturn, or become inoperable.

B. Provide anchorages in conformance with recommendations of the equipment manufacturer and as shown on approved shop drawings and calculations.

C. Construct seismic restraints and anchorage to allow for thermal expansion.

D. Testing Before Final Inspection:

1. Test 10-percent of anchors in masonry and concrete per ASTM E488, and ACI 355.2 to determine that they meet the required load capacity. If any anchor fails to meet the required load, test the next 20 consecutive anchors, which are required to have zero failure, before resuming the 10-percent testing frequency.
2. Before scheduling Final Inspection, submit a report on this testing indicating the number and location of testing, and what anchor-loads were obtained.

### 3.2 EQUIPMENT RESTRAINT AND BRACING

A. See drawings and specifications for equipment to be restrained or braced.

### 3.3 MECHANICAL DUCTWORK AND PIPING; ELECTRICAL BUSWAYS, CONDUITS, AND CABLE TRAYS; AND TELECOMMUNICATION WIRES AND CABLE TRAYS

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

B. Brace duct and breeching branches with a minimum of 1 brace per branch.

C. Provide supports and anchoring so that, upon application of seismic forces, piping remains fully connected as operable systems which will not displace sufficiently to damage adjacent or connecting equipment, or building members.

D. Seismic Restraint of Piping:

1. Design criteria:
   a. Piping resiliently supported: Restrain to support 120 percent of the weight of the systems and components and contents.
   b. Piping not resiliently supported: Restrain to support 60 percent of the weight of the system components and contents.

E. Piping Connections: Provide flexible connections where pipes connect to equipment. Make the connections capable of accommodating relative

differential movements between the pipe and equipment under conditions of earthquake shaking.

**3.4 PARTITIONS**

A. In buildings with flexible structural frames, anchor partitions to only structural element, such as a floor slab, and separate such partition by a physical gap from all other structural elements.

B. Properly anchor masonry walls to the structure for restraint, so as to carry lateral loads imposed due to earthquake along with their own weight and other lateral forces.

**3.5 CEILINGS AND LIGHTING FIXTURES**

A. At regular intervals, laterally brace suspended ceilings against lateral and vertical movements, and provide with a physical separation at the walls.

B. Independently support and laterally brace all lighting fixtures. Refer to applicable portion of lighting specification, Section 26 51 00, INTERIOR LIGHTING.

**3.6 GLAZING**

A. Do not install concrete masonry unit filler walls in a manner that can restrain the lateral deflection of the building frame. Provide a gap with adequately sized resilient filler to separate the structural frame from the non-structural filler wall.

**3.7 STORAGE RACKS, CABINETS, LOCKERS, AND BOOKCASES**

A. Install storage racks to withstand earthquake forces and anchored to the floor or laterally braced from the top to the structural elements.

B. Anchor medical supply cabinets to the floor or walls and equip them with properly engaged, lockable latches.

C. Anchor filing cabinets that are more than 2 drawers high to the floor or walls, and equip all drawers with properly engaged, lockable latches.

D. Anchor metal lockers to walls; anchor freestanding metal lockers to floor and to each other.

E. Anchor bookcases that are more than 30 inches high to the floor or walls, and equip any doors with properly engaged, lockable latches.

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# SECTION 14 21 11
# TRACTION CARTLIFTS CL-1, CL-2

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section specifies the engineering, furnishing, and installation of the complete ready for operation traction cartlift system as described herein and indicated on the Contract drawings.

B. Items listed in the singular apply to each and every cartlift in this specification, except where noted.

C. Cartlifts for SPD,CL-1, front and rear openings, clean car, CL-2, front opening, dirty car, shall be geared traction, microprocessor controller, AC VVVF motor control, with central station dispatching, signal system, car leveling device, power operated car and hoistway doors.

1. SPD Clean Cart CL-1. Eliminate existing ground floor front door entrance. Remove existing door, door frame, hall push buttons and hall position indicator. Block up existing door opening with fire rated material as per Code. Replace with new rear entrance at ground floor. Install new doors, entrance frame, hall push button and hall position indicator.

### 1.3 DEMOLITION

A. In machine room, remove existing controller, machines, governors, generators, hoist cables. **COURION CONTROL EQUIPMENT.**

B. Fronts, remove existing hall lanterns and call and send push button plates and access switches. Reuse hoistway frames.

C. Hoistway, remove existing cab and car equipment, limits, buffers, pit channels, governor tension sheaves, governor cables switches, door operator, car frame, ejection system. Remove everything except rails and brackets, hoistway door sill, and door frames.

### 1.4 RELATED WORK

A. Section 01 33 23 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

B. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.

C. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.

D. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
F. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
G. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for installing the over-current protective devices to ensure proper equipment and personnel protection.
H. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low voltage transformers.
I. Section 26 24 16, PANELBOARDS: Low voltage panelboards.

**1.5 QUALIFICATIONS**

A. Approval by the Contracting Officer is required for products or services of proposed manufacturers, suppliers, and installers and shall be contingent upon submission by Contractor of certificates stating the following:
   1. Elevator contractor is currently and regularly engaged in the installation of elevator equipment as one of his principal products.
   2. Elevator contractor shall have three years of successful experience, trained supervisory personnel, and facilities to install elevator equipment specified herein.
   3. The installers shall be Certified Elevator Mechanics with technical qualifications of at least five (5) years of successful experience and Apprentices actively pursuing certified mechanic status. Certificates shall be submitted for all workers employed in this capacity.
   4. Elevator contractor shall submit a list of two or more prior hospital installations where all the cartlift equipment he proposes to furnish for this project has performed satisfactorily under conditions of normal hospital use. Provide a list of hospitals that have the equipment in operation for two (2) years preceding the date of this specification. Provide the names and addresses of the Medical Centers and the names and telephone numbers of the Medical Center Administrators.
B. Approval of Elevator Contractor’s equipment will be contingent upon their identifying an elevator maintenance service provider that shall

render services within two (2) hours of receipt of notification, together with certification that the quantity and quality of replacement parts stock is sufficient to warranty continued operation of the elevator installation.

C. Approval will not be given to elevator contractors and manufacturers who have established on prior projects, either government, municipal, or commercial, a record for unsatisfactory elevator installations, have failed to complete awarded contracts within the contract period, and does not have the requisite record of satisfactorily performing cartlift installations of similar type and magnitude.

D. All electric traction cartlifts shall be the product of the same manufacturer.

E. The Contractor shall provide and install only those types of safety devices that have been subjected to tests witnessed and certified by an independent professional testing laboratory that is not a subsidiary of the firm that manufactures supplies or installs the equipment.

F. Welding at the project site shall be made by welders and welding operators who have previously qualified by test as prescribed in American Welding Society Publications AWS Dl.1 to perform the type of work required. VAMC shall require welding certificates be submitted for all workers employed in this capacity. A welding or hot work permit is required for each day and shall be obtained from the COTR of safety department. Request permit one (1) day in advance.

G. Electrical work shall be performed by Licensed Electricians as requirements by NEC. Certificates shall be submitted for all workers employed in this capacity.

**1.6 APPLICABLE PUBLICATIONS**

A. The publications listed below form a part of this specification. Cartlift installation shall meet the requirements of the latest editions published and adopted by the United States Department of Veterans Affairs on the date contract is signed.

B. Federal Specifications (Fed. Spec.):

J-C-30B.....Cable and Wire, Electrical (Power, Fixed Installation)

W-C-596F.....Connector, Plug, Electrical; Connector, Receptacle, Electrical

W-F-406E.....Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible

HH-I-558C.....Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)

W-F-408E.....Fittings for Conduit, Metal, Rigid (Thick- Wall and Thin-wall (EMT) Type)

RR-W-410.....Wire Rope and Strand

TT-E-489J.....Enamel, Alkyd, Gloss, Low VOC Content

QQ-S-766 .....Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip

C. International Building Code (IBC).

D. American Society of Mechanical Engineers (ASME):

A17.1 2010.....Safety Code for Elevators and Escalators

A17.2 2010.....Inspectors Manual for Electric Elevators and Escalators

E. National Fire Protection Association:

NFPA 13.....Standard for the Installation of Sprinkler Systems

NFPA 70.....National Electrical Code (NEC) Latest Edition

NFPA 72.....National Fire Alarm and Signaling Code

NFPA 101.....Life Safety Code

NFPA 252.....Fire Test of Door Assemblies

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

A1008/A1008M-09.....Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Farability

E1042-02.....Acoustically Absorptive Materials Applied by Trowel or Spray

G. Gauges:

For Sheet and Plate: U.S. Standard (USS)

For Wire: American Wire Gauge (AWG)

H. American Welding Society (AWS):

D1.1.....Structured Welding Code Steel

I. National Electrical Manufacturers Association (NEMA):

LD-3.....High-Pressure Decorative Laminates

J. Underwriter's Laboratories (UL):

486A.....Safety Wire Connectors for Copper Conductors

797.....Safety Electrical Metallic Tubing

K. Institute of Electrical and Electronic Engineers (IEEE).

**1.7 SUBMITTALS**

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

B. Before execution of work, furnish information to evidence full compliance with contract requirements for proposed items. Such information shall include, as required: Manufacturer's Name, Trade Names, Model or Catalog Number, Nameplate Data (size, capacity, and rating) and corresponding specification reference (Federal or project specification number and paragraph). All submitted drawings and related cartlift material shall be forwarded to the VAMC Chief Engineer William Horton.

C. Shop Drawings:

1. Complete scaled and dimensioned layout in plan and section view showing the arrangement of equipment and all details of each and every cartlift unit specified including:
   a. Hoisting machines, controllers, power conversion devices, governors, and all other components located in machine room.
   b. Car, sheaves, supporting beams, buffers, size of car platform, car frame members, and other components located in hoistway.
   c. Weights of principal parts.
   d. Location of shunt trip circuit breaker, switchboard panel, light switch, and feeder extension points in the machine room.
   e. Drawings showing new chains and sprockets for hoistway doors.

D. All Courion Equipment.

E. Samples:

1. One each of stainless steel, 75 mm x 125 mm (3 inches x 5 inches).
2. One each hall lantern/position indicator sample.
3. One each car lighting sample.
4. No other samples of materials specified shall be submitted unless specifically requested after submission of manufacturer's name. If additional samples are furnished pursuant to request, adjustment in contract price and time will be made as provided in Section 00 72 00, GENERAL CONDITIONS.

F. Name of manufacturer, type or style designation, and applicable data of the following equipment shall be shown on the cartlift layouts:

1. Hoisting machine.

2. Hoisting machine motor, HP rating, and RPM.
3. Controller
4. Starters and overload current protection devices.
5. Car safety devices; maximum and minimum rated loads and rated speeds.
6. Governor
7. Electric door operator; HP rating and RPM of motor. (Courion)
8. Hoistway door interlocks and retiring cams. (Courion)
9. Car and counterweight spring buffers;
10. Hoist ropes; ultimate breaking strength, allowable working load, and actual working load.

G. Complete construction drawings of cartlift enclosure, showing dimensioned details of construction, fastenings to platform, car lighting, and location of car equipment.

H. Complete dimensioned detail of vibration-isolating foundation for traction hoisting machine.

I. Dimensioned drawings showing details of:
1. All signal and operating fixtures.
2. Car and counterweight roller guides.
3. Door operators.

J. Drawings showing details of controller.

K. Furnish certificates as required under: Paragraph "QUALIFICATIONS".

**1.8 WIRING DIAGRAMS**

A. Provide three (3) complete sets of field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway, machine room and fixtures. Install one set coated with an approved plastic sealer and mounted in the cartlift machine room as directed by the Project Engineer.

B. In the event field modifications are necessary during installation, diagrams shall be revised to include all corrections made prior to and during the final inspection. Corrected diagrams shall be delivered to the Project Engineer within 30 days of final acceptance.

C. Provide the following information relating to the specific type of microprocessor controls installed:
1. Owner's information manual, containing job specific data on major components, maintenance, and adjustment.
2. System logic description.

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

**1.9 ADDITIONAL EQUIPMENT**

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

B. Special equipment not required by specification, which would improve the operation, may be installed in conjunction with the specified equipment by the contractor at his option at no additional cost to the Government, provided prior approval is obtained from the Contracting Officer’s Technical Representative.

**1.10 PERFORMANCE STANDARDS**

A. The cartlift shall meet the highest standards of the industry and specifically the following:
   1. Contract speed is high speed in either direction of travel with rated capacity load in the cartlift. Speed variation under all load conditions, regardless of direction of travel, shall not vary more than three (3) percent.
   2. The controlled rate of change of acceleration and retardation of the car shall not exceed 0.1G per second and the maximum acceleration and retardation shall not exceed 0.2G per second.
   3. Starting, stopping, and leveling shall be smooth without appreciable steps of acceleration and deceleration.

B. The door operator shall open the car door and hoistway door simultaneously at 0.3 m (1 foot) per second and close at 0.3 m (1 foot) per second.

C. Cartlift control system shall be capable of starting the car without noticeable "roll-back" of hoisting machine sheave, regardless of load condition in car, location of car, or direction of travel.

D. Floor level stopping accuracy shall be within 3 mm (1/8-inch) above or below the floor, regardless of load condition.

E. Noise and Vibration Isolation: All cartlift equipment including their supports and fastenings to the building, shall be mechanically and electrically isolated from the building structure to minimize objectionable noise and vibration transmission to car, building structure, or adjacent occupied areas of building.

F. Sound Isolation: Noise level relating to cartlift equipment operation in machine room shall not exceed 80 dBA. All dBA readings shall be taken 0.9 m (3 feet) off the floor and 0.9 m (3 feet) from equipment.

G. Airborne Noise: Measured noise level of cartlift equipment during operation shall not exceed 50 dBA in cartlift lobbies under any condition including door operation.

**1.11 WARRANTY**

A. Submit all labor and materials furnished in connection with cartlift system and installation to terms of "Warranty of Construction" articles of FAR clause 52.246-21. The One Year Warranty shall commence after final inspection, completion of performance test, and upon full acceptance of the installation and shall concur with the guarantee period of service.

B. During warranty period if a device is not functioning properly or in accordance with specification requirements, or if in the opinion of the Contracting Officer’s Representative, excessive maintenance and attention must be employed to keep device operational, device shall be removed and a new device meeting all requirements shall be installed as part of work until satisfactory operation of installation is obtained. Period of warranty shall start anew for such parts from date of completion of each new installation performed, in accordance with foregoing requirements.

**PART 2 – PRODUCTS, OPERATION**

**2.1 MATERIALS**

A. Where stainless steel is specified, it shall be corrosion resisting steel complying with Fed. Spec. QQ-S-766, Class 302 or 304, Condition A with Number 4 finish on exposed surfaces. Stainless steel shall have the grain of belting in the direction of the longest dimension and

surfaces shall be smooth and without waves. During installation all stainless steel surfaces shall be protected with suitable material.

B. Where cold rolled steel is specified, it shall be low-carbon steel rolled to stretcher leveled standard flatness, complying with ASTM A109.

**2.2 MANUFACTURED PRODUCTS**

A. Materials, devices and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items. Items not meeting this requirement but meet technical specifications which can be established through reliable test reports or physical examination of representative samples will be considered.

B. When two or more devices of the same class of materials or equipment are required, these devices shall be products of one manufacturer.

C. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for the final assembled unit.

1. Individual components of assembled units shall be products of the same manufacturers.
2. Parts which are alike shall be the product of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for the intended service.

D. Motor nameplates shall state manufacturers' name, rated horsepower, speed, volts, amperes and other characteristics required by NEMA Standards and shall be securely attached to the item of equipment in a conspicuous location.

E. The cartlift equipment, including controllers, door operators, and supervisory system shall be the product of manufacturers of established reputation, provided such items are capably engineered and produced under coordinated specifications to ensure compatibility with the total operating system. Mixing of manufactures related to a single system or group of components shall be identified in the submittals.

F. Where key operated switches are furnished in conjunction with any component of this cartlift installation, furnish four (4) keys for each individual switch or lock. Provide different key tumblers for different switch and lock functions. Each and every key shall have a tag bearing a stamped or etched legend identifying its purpose. Barrel key switches are not acceptable, except where required by code.

G. If the cartlift equipment to be installed is not known to the Resident Engineer the Contractor shall submit drawings in triplicate for approval to the Project Engineer, Contracting Officer, and VA CFM Elevator Engineer showing all details and demonstrate that the equipment to be installed is in strict accordance with the specifications.

**2.3 CAPACITY, SIZE, SPEED, AND TRAVEL**

A. Each cartlift shall have the capacity to lift a live load, including the weight of the car and cables, at the speed specified in the following schedule:

| **CARTLIFT SCHEDULE** | |
|---|---|
| Cartlift Number | CL-1, clean car, Front and Rear opening.<br>CL-2, dirty car, front opening. |
| Overall Platform Size | Same as existing. |
| Rated Load - kg(lb) | 1000 lbs. |
| Contract Speed - m/s(fpm) | 150 fpm. |
| Total Travel - m/s(ft) | 50ft. 1in. |
| Number of Stops | 2, G-4 |
| Number of Openings | 2 |
| Type of Roping | 1-1 |
| Entrance Type and Size | Existing |

**2.4 POWER SUPPLY**

A. For power supply in each machine room, see Specification 26 05 19, Electrical specifications, and Electrical drawings.

B. It shall be the Electrical contractor's responsibility to supply the labor and materials for the installation of the following:

l. Feeders from the power source indicated on the drawings to each cartlift controller.

2. Shunt Trip Circuit Breaker for each controller shall be located inside machine room at the strike side of the machine room door and lockable in the “Off” position.

**2.5 CONDUIT AND WIREWAY**

A. Remove all existing duct and conduit from hoistway. May reuse machine room duct if it meets NEC -70 code.

B. Unless otherwise specified or approved, install electrical conductors, except traveling cable connections to the cartlift, in rigid zinc-coated steel or aluminum conduit, electrical metallic tubing or metal wireways. Rigid conduit smaller than 3/4 inch or electrical metallic tubing smaller than 1/2 inch electrical trade size shall not be used. All raceways completely embedded in concrete slabs, walls, or floor fill shall be rigid steel conduit. Wireway (duct) shall be installed in the hoistway and to the controller and between similar apparatus in the cartlift machine room. Fully protect self-supporting connections, where approved, from abrasion or other mechanical injury. Flexible metal conduit not less than 3/8 inch electrical trade size may be used, not exceeding 457 mm (18 inches) in length unsupported, for short connections between risers and limit switches, interlocks, and for other applications permitted by NEC.

C. All conduit terminating in steel cabinets, junction boxes, wireways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. Install a steel lock nut under the bushings if they are constructed completely of insulating materials. Protect the conductors at ends of conduits not terminating in steel cabinets or boxes by terminal fittings having an insulated opening for the conductors.

D. Rigid conduit and EMT fittings and connectors using set screws or indentations as a means of attachment shall not be used. All fittings shall be steel or malleable iron.

E. Connect motors or other items subject to movement, vibration or removal to the conduit or EMT systems with flexible, steel conduits.

**2.6 CONDUCTORS**

A. Unless otherwise specified, conductors, excluding the traveling cables, shall be stranded or solid coated annealed copper in accordance with Federal Specification J-C-30B for Type RHW or THW. Where 16 and 18 AWG are permitted by NEC, single conductors or multiple conductor cables in accordance with Federal Specification J-C-580 for Type TF may be used provided the insulation of single conductor cable and outer jacket of multiple conductor cable is flame retardant and moisture resistant. Multiple conductor cable shall have color or number coding for each conductor. Conductors for control boards shall be in accordance with NEC. Joints or splices are not permitted in wiring except at outlets.

Tap connectors may be used in wireways provided they meet all UL requirements.

B. Provide all conduit and wiring between machine room, hoistway and fixtures.

C. All wiring must test free from short circuits or ground faults. Insulation resistance between individual external conductors and between conductors and ground shall be a minimum of one megohm.

D. Where size of conductor is not given, voltage and amperes shall not exceed limits prescribed by NEC.

E. Provide equipment grounding. Ground the conduits, supports, controller enclosure, motor, platform and car frame, and all other non-current conducting metal enclosures for electrical equipment in accordance with NEC. The ground wires shall be copper, green insulated, and sized as required by NEC. Bond the grounding wires to all junction boxes, cabinets, and wire raceways.

F. Terminal connections for all conductors used for external wiring between various items of cartlift equipment shall be solderless pressure wire connectors in accordance with Federal Specification W-S-610. The Contractor may, at his option, make these terminal connections on #10 or smaller conductors with approved terminal eyelets set on the conductor with a special setting tool, or with an approved pressure type terminal block. Terminal blocks using pierce-through serrated washers are not acceptable.

**2.7 TRAVELING CABLE**

A. All conductors to the car shall consist of flexible traveling cables conforming to the requirements of NEC. Traveling cables shall run from the junction box on the car directly to the controller. Junction boxes on the car shall be equipped with terminal blocks. Terminal blocks having pressure wire connectors of the clamp type that meet UL 486A requirements for stranded wire may be used in lieu of terminal eyelet connections. Terminal blocks shall have permanent indelible identifying numbers for each connection. Cables shall be securely anchored to avoid strain on individual terminal connections. Flame and moisture resistant outer covering must remain intact between junction boxes. Abrupt bending, twisting and distortion of the cables shall not be permitted.

B. Provide spare conductors equal to 10 percent of the total number of conductors furnished, but not less than 5 spare conductors in each traveling cable.

C. If traveling cables come into contact with the hoistway or cartlift due to sway or change in position, provide shields or pads to the cartlift and hoistway to prevent damage to the traveling cables.

D. Hardware cloth may be installed from the hoistway suspension point downward to the cartlift pit to prevent traveling cables from rubbing or chafing. Hardware cloth shall be securely fastened and tensioned to prevent buckling. Hardware cloth is not required when traveling cable is hung against a flat wall.

**2.8 CONTROLLERS**

A. UL/CSA Labeled Controller: Mount all assemblies, power supplies, chassis switches, and relays on a self-supporting steel frame. Completely enclose the equipment and provide a mean to control the temperature. Solid state components shall be designed to operate between 32 to 104 degrees Fahrenheit, humidity non-condensing up to 85 percent.

B. Properly identify each device on all panels by name, letter, or standard symbol which shall be neatly stencil painted or decaled in an indelible and legible manner. Identification markings shall be coordinated with identical markings used on wiring diagrams. The ampere rating shall be marked adjacent to all fuse holders. All spare conductors to controller shall be neatly formed, laced, and identified.

**2.9 MICROPROCESSOR CONTROL SYSTEM**

A. Provide a microprocessor based system (Motion Control, MCE 4000) with absolute position/speed feedback encoded tape to control the hoisting machine and signal functions in accordance with these specifications. Complete details of the components and printed circuit boards, together with a complete operational description, shall be submitted for approval.

1. All controllers shall be non-proprietary.
2. Proprietary tools shall not be necessary for adjusting, maintenance, repair, and testing of equipment.
3. Controller manufacturer shall provide factory training, engineering and technical support, including all manuals and wiring diagrams to

the VA Medical Center's designated Elevator Maintenance Service Provider.

4. Replacement parts shall be shipped overnight within 48 hours of an order being received.

B. All controller assemblies shall provide smooth, step-less acceleration and deceleration of the cartlift, automatically and irrespective of the load in the car. All control equipment shall be enclosed in metal cabinets with lockable, hinged door(s) and shall be provided with a means of ventilation. All non-conducting metal parts in the machine room shall be grounded in accordance with NEC. Cabinet shall be securely attached to the building structure.

C. Circuit boards for the control of each and every cartlift system; dispatching, signals, door operation and special operation shall be installed in a NEMA Type 1 General Purpose Enclosure. Circuit boards shall be moisture resistant, non-corrosive, non-conductive, fabricated of non-combustible material and adequate thickness to support the components mounted thereon. Mounting racks shall be spaced to prevent accidental contact between individual circuit boards and modules.

D. Modules shall be the type that plug into pre-wired mounting racks. Field wiring or alteration shall not be necessary in order to replace defective modules.

E. Each device, module and fuse (with ampere rating) shall be identified by name, letter or standard symbol in an approved indelible and legible manner on the device or panel. Coordinate identification markings with identical markings on wiring diagrams.

F. The electrical connections between the printed circuit boards (modules) and the circuit connectors incorporated in the mounting racks shall be made through individual tabs which shall be an integral part of each module. The tabs shall be nickel-gold plated or other approved metal of equal electrical characteristics. Modules shall be keyed or notched to prevent insertion of the modules in the inverted position.

G. Light emitting diodes (LED) shall be for visual monitoring of individual modules.

H. Components shall have interlocking circuits to assure fail-safe operation and to prevent cartlift movement should a component malfunction.

I. Method of wire wrapping from point to point with connections on the mounting racks shall be submitted for approval.

J. Field wiring changes required during construction shall be made only to the mounting rack connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules they shall be returned to the factory where design changes shall be made and module design records changed so correct replacement units will be available.

K. All logic symbols and circuitry designations shall be in accordance with ASME and NEC Standards.

L. Solid state components shall be designed to operate within a temperature range of 0 to 40 degrees C (32 to 104 degrees F), humidity non-condensing up to 85 percent.

M. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce through serrated washers shall not be used.

N. The elevator controller and the Cart-matic controller must be crossed connected and intergrated.

**2.10 VVVF AC MOTOR CONTROL**

A. Variable Voltage Variable Frequency Motor Control:

1. Cartlift control shall be affected by means of a compact solid state motor control unit for each and every cartlift with electrical characteristics to suit the power supply. The system shall consist of the necessary three phase, full-wave bridge rectifiers.
2. Solid state motor control unit shall operate with high efficiency and low power consumption, have the capacity to handle peak currents typical of cartlift service and contain a balanced, coordinated fault protection system which shall accomplish the following:
   a. Protect the complete power circuit and specifically the power semi-conductors from failure under short circuit (bolted fault) conditions.
   b. Protect against limited faults arising from partial grounds, partial shorts in the motor armature or in the power unit itself.
   c. Protect the drive motor against sustained overloads. A solid state overload circuit shall be used.
   d. Protect motor and power unit against instantaneous peak overload.

e. Provide semi-conductor transient protection.

f. Provide phase sequence protection to ensure incoming line is phased properly.

g. Removable printed circuit boards shall be provided for the VVVF control. Design tabs so boards cannot be reversed.

**2.11 COURION CONTROLLER, EQUIPMENT**

A. Reuse existing hoistway entrance frames, sills, and hoistway door guide rails.

B. Provide new bi-parting, counterbalanced doors with #16 gauge roomside and shaftside stainless steel doors. Door panels to be complete with approved interlocks, lock bars, door sheaves, chains, power operators, and safety meeting rails. The door panels will bear an Underwriters 1-1/2 hour B panel.

C. Bi-parting steel car gates with power door operators.

D. Retiring cams with power units.

E. 16 gauge stainless steel car enclosure with steel platforms and recessed light fixture. Steel platform shall be integral with car enclosure, and arranged to receive and support the Courion Cart-matic (Eject system with all chains and motors requirements) transfer device. Audible buzzer, single strobe light, push button station at each open end of enclosure consisting of emergency stop switch, alarm bell and access enable key switch.

F. Cart-matic transfer device, automatic load/unload device.

G. Microprocessor based Cart-matic controller to provide selective automatic operation of the Courion equipment. Cart-matic controller shall be cross connected and integrated with elevator controller

H. Emergency unlocking device.

I. Infrared non-contact reversing edges.

**2.12 CALL AND SEND OPERATION: CARTLIFT**

A. Dispatch cart from make-up area level to designated floor and return.

1. Cart shall be manually placed on cartlift platform. Destination button activation shall illuminate that button indicating call registration.

2. Sequence of Operation:

a. Place cart in front of cartlift doors.

b. Cart eject system shall come out under cart and pick up and pull cart into cartlift.

c. Hoistway and cartlift doors shall automatically close.
d. Cartlift shall proceed to the designated floor.
e. Arrival hall position indicator with lantern shall light and sound prior to the door's opening.
f. Hoistway and cartlift doors shall open automatically.
g. Cart will be ejected from cartlift.
h. Hoistway and car doors shall close automatically or manually by pressing the door close button.
i. Cartlift shall return to the central station floor or remain at this level and park with its hoistway and car doors closed until another dispatch is made.
j. If a cart is not unloaded at the destination floor, an adjustable timer, set at between sixty (60) seconds and two hundred forty (240) seconds will close the doors starting with a five (5) second warning buzzer. The car will return to Central Station with the cart.

**2.13 CORRIDOR OPERATING STATIONS AND CONTROL PANEL**

A. Operating stations and control panel shall be stainless steel, flush mounted adjacent to hoistway entrances.
   1. All faceplates shall have all edges beveled 15 degrees.
   2. Fasten all faceplates with non-corrosive stainless steel tamperproof screws.
   3. Operating push buttons in faceplates shall be designed so that pressure on contact shall be independent of pressure on operating push button.
   4. Each switch and operating device shall have indelible, 6 mm (1/4-inch) high legends to indicate its identity and position.

B. Provide each floor served by cartlift with a complete set of operating push buttons with 13 mm (1/2-inch) numbers in the face of the button corresponding to the floors served. Push buttons shall not protrude beyond the faceplate when in normal position. Call register lights shall be LED illuminated located within or behind the buttons. Illuminate the floor numeral corresponding to the call registered. Provide an “In Use” light in this panel to show when cartlift is in operation or the door is open.

C. Provide cartlift with a control panel at the makeup area and at other floors as shown on drawings, containing the following:

1. Key operated "ON/OFF" service switch.
2. “Call” and “Send” buttons to upper floors.
3. Door "Open" and "Close" buttons for maintenance purposes and manual operation.
4. A red LED illuminated indicator light to indicate a malfunction in the system.

**2.14 INTERCOM SYSTEM**

A. Provide an intercom system between the ground floor and 4th floor. Locate in a separate box above the new hall push buttons and recessed in the wall. The intercom shall have a ”Push to talk” button with call and send operation.

**2.15 CORRIDOR POSITION INDICATORS**

A. Provide each car with a corridor position indicator with lanterns mounted over the hoistway entrances at each and every floor. Each lantern shall contain a single stroke chime so connected that when the cartlift arrives at a landing, the chime shall sound momentarily. The lenses in each lantern shall be red LED illuminated. Lanterns shall signal in advance of carlift arrival at the landing. Each lantern shall be equipped with a clearly audible electronic chime which shall sound once for carlift arrival. Provide adjustable sound level on audible signal. Car riding lanterns are not acceptable.

**2.16 MACHINE BEAMS**

Reuse existing.

**2.17 GEARED TRACTION MACHINE**

A. Geared Traction Hoist Machine:
1. Worm geared traction type with an AC motor, brake, gear, drive shaft, deflector sheave, and gear case mounted in proper alignment on an isolated bedplate.
2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
3. Armature must be electrically balanced and together with motor coupling and brake, mechanically balanced.
4. The structural design of the motor shall insure perfect alignment of bearings. The rotating elements shall be dynamically balanced to minimize vibration.
5. Thrust bearings shall be ball, roller, or radial type, of the highest grade, designed to take thrust in both directions. Motor

and sheave bearings shall be ball or roller type. Bearings shall be of ample size, self-aligning or preloaded, non-adjustable, and arranged to eliminate backlash.

6. Hoisting machine brake shall be drum type or disc type and shall have the capacity to hold the elevator with 125 percent of rated load. Arrange brake circuits so that no current shall be applied to the brake coil prior to the establishment of the hoistway door interlock circuit, except during leveling and releveling operation.
7. Provide hoist machine drip pans to collect lubricant seepage.

**2.18 SHEAVES**

A. Deflector sheaves shall be securely mounted in machine room on beams in proper alignment with the traction sheave.

B. Deflector sheave bearings shall be the same as specified for hoisting machine, except that sheave bearings of the anti-friction bearing metal type with grease cup lubrication may be used for deflector sheaves.

**2.19 HOIST ROPES**

A. Provide cartlift with the required number and size of ropes to ensure adequate traction for the range of loads with a factor of safety not less than required by ASME A17.1 Section 2.20. Hoisting ropes shall be preformed 8 x 19 or 8 x 25 traction steel, complying with Federal Specification RR-W-410 with minimum nominal diameter of 0.50 inch. For machines located overhead, 6 x 19 preformed traction steel hoisting ropes may be used in lieu of 8 x 19 that meet the requirements of the sheave manufacturer, at the elevator contractor’s option.

B. Securely attach a corrosion resistant metal data tag to one hoisting rope fastening on the cartlift.

C. Provide wedge type shackles.

**2.20 GOVERNOR ROPE**

A. Governor Rope shall be 6 x 19 or 8 x 19 wire rope, preformed traction steel, uncoated, fiber core, conforming to Federal Specification RR-W-410 with minimum nominal diameter of 0.375-inch having a minimum safety factor of five (5). Tiller rope construction is not acceptable.

B. Under normal operation, rope shall run free and clear of governor jaws, rope guards, and other stationary parts.

C. Securely attach governor rope tag to governor rope releasing carrier. Data tag shall be corrosion-resisting metal and bear data as required by ASME Code A17.1.

**2.21 SPEED GOVERNOR**

A. Provide Centrifugal type car driven governor, in accordance with ASME A17.1 Section 2.18, and 7.2.5 to operate the car safety device. Governor shall be complete with weighted pit tension sheave, governor release carrier and mounting base with protected cable sleeves.

B. Furnish overspeed switch and speed reducing switches when required.

C. The governor rope clamping device shall be designed so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the safety.

D. Bearing shall be either self-oiling or Zerk fitting type connections. Ball or roller bearings may be used in lieu of sleeve type.

E. Provide metal guard over top of governor rope and sheaves.

F. Governor, with the exception of finished surfaces, screw threads, etc., shall be factory painted and shall operate freely. Field painting of governor parts shall be permitted in accordance with ASME A17.1 Rule 2.18.3.1.

G. Where the elevator travel does not exceed 100 feet, the weight tension sheave may be mounted on a pivoted steel arm in lieu of operating in steel guides.

**2.22 CAR SAFETY DEVICE**

A. Provide “Type A Safeties” on the cartlift that meet the requirements of ASME A17.1 Section 2.17.

B. Field testing of the safeties and governor shall be as specified in Section 3.7 PRETEST and TEST of this specification.

**2.23 CAR AND COUNTERWEIGHT BUFFERS**

A. Remove existing pit channels and install new pit channels.

B. Provide two buffers for each car and one for each counterweight that meet the requirements of ASME A17.1 Section 2.22. Securely fasten buffers and supports to the pit channels and in alignment with striker plates on car and counterweight. Every installed buffer shall have a permanently attached metal plate indicating its stroke and load rating. Buffer anchorage shall not puncture pit waterproofing.

C. Design and install buffers to provide minimum car runby required by ASME A17.1 Rule 2.4.2.

D. Furnish pipe stanchions and struts as required to properly support the buffer.

**2.24 COUNTERWEIGHT; REUSE EXISTING**

A. Cartlift shall be counterweighted to the extent of the weight of the car plus 40 percent of the rated capacity load, as required by controller manufacturer.

B. Provide counterweight guard in pit in accordance with ASME A17.1 Rule 2.3.2.

**2.25 CAR AND COUNTERWEIGHT ROLLER GUIDES**

A. Provide car and counterweight with adjustable roller guides.

B. Each guide shall be of an approved type consisting of not less than three (3) wheels, each with a durable, resilient oil-resistant material tire rotating on ball bearings having sealed-in lubrication. Assemble rollers on a substantial metal base and mount to provide continuous spring pressure contact of all wheels with the corresponding rail surfaces under all conditions of loading and operation. Secure the roller guides at top and bottom on each side of car frame and counterweight frame. All mounting bolts shall be fitted with nuts, flat washers, split lock washers, and if required, beveled washers.

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

D. Minimum diameter of car rollers shall be 4 inches. The entire elevator car shall be properly balanced to equalize pressure on all guide rollers. Cars shall be balanced in post-wise and front-to-back directions. Test for this balanced condition shall be witnessed at time of final inspection.

E. Minimum diameter of counterweight rollers shall not be less than 3 inches. Properly balance counterweight frame to equalize pressure on all guide rollers. The Contractor shall have the option of furnishing, for counterweight only, mechanically adjusted roller guide in lieu of spring loaded roller guides as specified.

F. Equip all cars and counterweight with an auxiliary guiding device for each guide shoe which shall prevent the car or counterweight from leaving the rails in the event that the normal guides are fractured. These auxiliary guides shall not, during normal operation, touch the guiding surfaces of the rails. Fabricate the auxiliary guides from hot rolled steel plate and mount between the normal guide shoes and the car and counterweight frames. The auxiliary guides may be an extension of the normal guide shoe mounting plate if that plate is fabricated from

hot rolled steel. The portion of the auxiliary guide which shall come in contact with the rail guiding surfaces in the event of loss of the normal guides shall be lined with an approved bearing material to minimize damage to the rail guiding surfaces.

**2.26 GUIDE RAILS, SUPPORTS AND FASTENINGS**

A. Reuse existing.

B. Guide rails shall conform to ASME A17.1 Section 2.23.

C. Guide rails shall be clean and free of any signs of rust, grease, or abrasion before final inspection. Paint the shank and base of the T-section with two field coats of manufacturer’s standard enamel.

**2.27 NORMAL AND FINAL TERMINAL STOPPING DEVICES**

A. Normal and final terminal stopping devices shall conform to ASME A17.1 Section 2.25.

B. Mount terminal slowdown switches and direction limit switches on the carlift or in hoistway to reduce speed and bring car to an automatic stop at the terminal landings.

1. Switches shall function with any load up to and including 125 percent of rated cartlift capacity at any speed obtained in normal operation.
2. Switches, when opened, shall permit operation of cartlift in reverse direction of travel.

C. Mount final terminal stopping switches in the hoistway.

1. Switches shall be positively opened should the car travel beyond the terminal direction limit switches.
2. Switches shall be independent of other stopping devices.
3. Switches, when opened, shall remove power from hoist motor, apply hoist machine brake, and prevent operation of car in either direction.

D. After final stopping switches have been adjusted, through bolt switches to guide rail.

**2.28 CROSSHEAD DATA PLATE AND CODE DATA PLATE**

A. Permanently attach a non-corrosive metal Data Plate to car crosshead. Data plate shall bear information required by ASME A17.1 Section 2.16.3 and Rule 2.20.2.1.

B. Permanently attach a Code Data Plate, in plain view, to the controller, ASME A17.1 Section 8.9.

**2.29 WORKMAN'S LIGHTS AND OUTLETS**

A. Provide duplex GFCI protected type receptacles and lamps with guards on top of each cartlift. The receptacles shall be in accordance with Fed. Spec. W-C-596 for Type D7, 2-pole, 3-wire grounded type, rated for 15 amperes and 125 volts.

**2.30 TOP OF CAR OPERATING DEVICE**

A. Provide a cartop operating device that meets the requirements of ASME A17.1 Section 2.26.

B. The device shall be activated by a toggle switch mounted in the device. The switch shall be clearly marked "INSPECTION" and "NORMAL" on the faceplate, with 6 mm (1/4-inch) letters.

C. Movement of the cartlift shall be accomplished by the continuous pressure on a direction button and a safety button.

D. Provide an emergency stop toggle type switch.

E. Provide permanent identification for the operation of all components in the device.

F. The device shall be permanently attached to the cartlift crosshead on the side of the cartlift nearest to the hoistway doors used for accessing the top of car.

**2.31 CARTLIFT LEVELING DEVICE**

A. Cartlift shall be equipped with a two-way leveling device to automatically bring the cartlift to within 3 mm (1/8-inch) of exact level with the landing for which a stop is initiated regardless of load in cartlift or direction.

B. If the cartlift stops short or travels beyond the floor, the leveling device, within its zone shall automatically correct this condition and maintain the cartlift within 3 mm (1/8-inch) of level with the floor landing regardless of the load carried.

C. Provide encoded steel tape, steel tape with magnets or steel vanes with magnetic switches. Submit design for approval.

**2.32 EMERGENCY STOP SWITCHES**

A. Provide an emergency stop switch for each top-of-cartlift device, pit, and machine spaces. Mount stop switches in the pit adjacent to pit access door, at top of the pit ladder 1220 mm (48 inches) above the bottom landing sill and 1220 mm (48 inches) above the pit floor adjacent to the pit ladder.

B. Each stop switch shall be red in color and shall have "STOP" and "RUN" positions legibly and indelibly identified.

**2.33 HOISTWAY ACCESS SWITCHES**

A. Provide hoistway access switches for cartlift at top terminal landing to permit access to top of car, and at bottom terminal landing to permit access to pit. Mount the access key switch and the “ON/OFF” access activation switches in the top and bottom corridor hall stations next to the hoistway entrance jamb. Exposed portion of each access switch or its faceplate shall have legible, indelible legends to indicate "UP", "DOWN", and "OFF" positions. Submit design and location of access switches for approval. Each access switch shall be a constant pressure cylinder type lock having not less than five pins or five stainless steel disc combination with key removable only when switch is in the "OFF" position. Lock shall not be operable by any other key which will operate any other lock or device used for any other purpose at the VA Medical Center. The hoistway switch shall initiate and maintain movement of the cartlift. When the cartlift is operated in the down direction from the top terminal landing, limit the zone of travel to a distance not greater than the top of the car crosshead level with the top floor.

B. Provide emergency access for all hoistway entrances, locked door release system (key access) for cartlifts.

**2.34 HOISTWAY ENTRANCES; COURION**

A. Reuse existing first floor and 4$^{th}$ floor door frame entrance jambs. Clean and polish.

B. Provide new stainless steel hoistway bi-parting doors.

1. Provide for each new door panel frame with four fixed or adjustable, malleable iron, mill-grooved, guide shoes not less than 2-1/2 inches. Weight and method of fastening to frames and hoistway, above and below, shall conform to a standard practice of cartlift manufacturer. Provide new gibs, chains, and steel sheaves with sealed ball or roller bearings. Provide guides and stops for door travel.
2. Door operators shall be heavy duty close loop power operators designed to automatically open car and hoistway doors upon arrival of car at each landing. Door shall close automatically upon completion of loading and unloading cycles. Door "opening" and

"closing" speed shall be one foot per second. Design, construction, and installation of doors and power operator shall preclude the possibility of doors opening until the car stop at a landing.

**2.35 ELECTRIC INTERLOCKS; COURION**

A. Equip each hoistway door with an interlock, functioning as hoistway unit system, to prevent operation of car until all hoistway doors are locked in closed position. Hoistway door interlock shall not be accepted unless it meets the requirements of ASME A17.1 Section 2.12.

B. Equip car doors with electric contact that prevents operation of car until doors are closed unless car is operating in leveling zone or hoistway access switch is used. Locate door contact to prevent its being tampered with from inside of car. Car door contact shall not be accepted unless it meets the requirements of ASME A17.1 Section 2.12.

C. Wiring installed from the hoistway riser to each door interlock shall be NEC type SF-2 or equivalent.

1. Type SF-2 cable terminations in the interlock housing shall be sleeved with glass braid fillers or equivalent.

D. Provide devices, either mechanical or electrical, that shall prevent operation of the cartlift in event of damaged or defective door equipment that has permitted an independent car or hoistway door panel to remain in the "unclosed" and "unlocked" position.

E. Install new retiring cam.

**2.36 CAR FRAME; COURION**

A. Construct car frames of structural shapes, ASTM A-36, rigidly bolted and welded together of adequate strength to support car with rated load and to conform to ASME A17.1 Rule 7.2.2.

B. Install new toe guard that meets code.

C. Provide a bonding wire between frame and platform if isolation frame is used.

**2.37 CAR ENCLOSURE; COURION**

A. Car shall have width and depth required for contract load and constructed of minimum 14-gauge stainless steel for walls and ceiling except car floor shall be minimum 16-gauge stainless steel. Construction shall conform to ASME A17.1 Rule 7.2.1. Car floor shall be reinforced to provide adequate support for loading and unloading unit and withstand impact of wheeled carts.

1. Provide car entrance with vertical bi-parting door constructed of sheet panels of stainless steel, guided and connected to each other by cables running over sheaves mounted at top of car. Car door shall be opened automatically and closed automatically by power operator.
2. Provide a flush mounted light fixture in car ceiling. Light shall be connected to illuminate automatically when car arrives at landing and hoistway door is opened, and shall be automatically extinguished when hoistway door is closed.
3. Provide metal nameplate in car showing name of manufacturer, rated load in pounds, and stamped, etched or raised letters.

B. Car top railings shall meet the requirements of ASME A17.1 Rules 2.14.11.7 and 2.10.2.

**2.38 POWER DOOR OPERATORS: COURION**

A. Provide a heavy duty powered door operator to automatically open the car and hoistway doors simultaneously when the car is level with a floor, and automatically close the doors simultaneously at the expiration of the door-open time. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Motor shall be of the high-internal resistance type, capable of withstanding high currents resulting from stall without damage to the motor. The door operator shall be capable of opening and closing the car door and hoistway door simultaneously, at a speed of 0.3 m (1 foot) per second. A reversal of direction of the doors from the closing to opening operation, whether initiated by obstruction or the door "OPEN" button, shall be accomplished within 38 mm (1-1/2 inches) of door movement.

**PART 3—EXECUTION**

**3.1 PREPARATION**

A. Before fabrication, take necessary job site measurements, and verify work governed by other trades. Check measurement of space for equipment, and means of access for installation and operation. Obtain dimensions from site for preparation of shop drawings.
   1. Provide pit ladder and guard.

2. Report defects to the Project Engineer in writing that may affect the work of this trade or equipment operation.

B. Ensure the following preparatory work provided under other sections of the specification has been provided. If the Elevator Contractor requires changes in size or location of hoisting beams or their supports and trap doors, etc., to accomplish his work, he must make arrangements, subject to approval of the Contracting Officer, and include additional cost in his bid. Locate controller near and visible from its respective hoist machine.

C. Work required prior to the completion of the cartlift installation:
   1. Supply of electric feeder wires to the terminals of the cartlift control panel, including circuit breaker.
   2. Provide new lights and GFCI outlets in the cartlift pit.
   3. Furnish electric power for testing and adjusting cartlift equipment.
   4. Furnish circuit breaker panel in machine room for car and hoistway lights and receptacles.
   5. Supply power for cab lighting.
   6. Provide fire extinguisher in machine room.

**3.2 SPACE CONDITIONS**

A. Code compliance is required for overhead clearance, pit clearances, the size of machine room including equipment clearances, and construction conditions at building site in connection with cartlift installation. Addition or revision of space requirements, or construction changes that may be required for the complete installation of the cartlift must be arranged for and obtained by the Contractor, subject to approval of Contracting Officer. Include cost of changes in bid that become a part of the contract. Provide proper, code compliant installation of equipment, including all construction, accessories and devices in connecting with cartlift, mechanical and electrical work specified.

B. Where concrete beams, floor slabs, or other building construction protrude more than 100 mm (4 inches) into hoistway, bevel all top surfaces of projections to an angle of 75 degrees with the horizontal.

**3.3 ARRANGEMENT OF EQUIPMENT**

A. Clearance around cartlift, mechanical and electrical equipment shall comply with applicable provisions of NEC. Arrange equipment in machine room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in the same

machine room. Where applicable, locate controller near and visible to its respective hoisting machine.

**3.4 INSTALLATION**

A. Installation shall be performed by Certified Elevator Mechanics and Apprentices skilled in this work and under the direct supervision of the Elevator Contractor’s experienced foreman.

B. Install machinery, guides, controls, carlift, all equipment and accessories, in accordance with manufacturer's instructions, applicable codes and standards.

C. Isolate and dampen machine vibration with properly sized sound-reducing anti-vibration pads.

**3.5 WORKMANSHIP AND PROTECTION**

A. Installations shall be performed by Certified Elevator Mechanics and Apprentices to best possible industry standards. Details of the installation shall be mechanically and electrically correct. Materials and equipment shall be new and without imperfections.

B. Recesses, cutouts, slots, holes, patching, grouting, refinishing to accommodate installation of equipment shall be included in the Contractor's work. All new holes in concrete shall be core drilled.

C. Structural members shall not be cut or altered. Work in place that is damaged or defaced shall be restored equal to original condition.

D. Finished work shall be straight, level and plumb, with true, smooth surfaces and lines. All machinery and equipment shall be protected against dirt, water, and mechanical injury. At final completion all work shall be thoroughly cleaned and delivered in perfect unblemished condition.

E. Sleeves for conduit and other small holes shall project 50 mm (2 inches) above concrete slabs.

F. Hoist cables which are exposed to accidental contact in the machine room and pit shall be completely enclosed with 16-gauge sheet metal guards.

G. Exposed gears, sprockets, and sheaves shall be guarded from accidental contact in accordance with ASME A17.1 Section 2.10.

**3.6 CLEANING**

A. Clean machine room and equipment after completion of installation and prior to final inspection, all equipment shall be thoroughly cleaned of grease, oil, cement, plaster, and other debris.

B. Perform hoistway clean down.

C. Prior to final acceptance remove protective covering from finished or ornamental surfaces. Clean and polish surfaces with regard to type of material.

**3.7 PAINTING AND FINISHING**

A. Hoist machine assembly shall be factory painted with manufacturer's standard finish and color.

B. Controller, sheave, car frame and platform, counterweight, beams, rails and buffers, cams, brackets and all other uncoated ferrous metal items, except their machined surfaces, shall be painted one factory priming coat or approved equal.

C. All equipment, except specified architectural finishes, shall be given two coats of paint of approved color, conforming to manufacturer's standard.

D. Field painting of governors shall be in accordance with ASME A17.1 Rule 2.18.3.1.

E. Stencil or apply decal floor designations not less than 100 mm (4 inches) high on hoistway doors, fascias or walls. The color of paint used shall contrast with the color of the surfaces to which it is applied.

F. Cartlift hoist machine, controller, governor, main line shunt trip circuit breaker, safety plank, and cross head of car shall be identified by 100 mm (4 inches) high numerals and letters located as directed. Numerals shall contrast with surrounding color and shall be stenciled or decals.

**3.8 PRE-TEST AND TEST**

A. Pre-test the cartlift and related equipment in the presence of the Project Engineer or his authorized representative for proper operation before requesting final inspection. Conduct final inspection at other than normal working hours, if required by Project Engineer.

1. Procedure outlined in the Inspectors Manual for Electric Elevators, ASME A17.2 shall apply.

   a. Final test shall be conducted in the presence of and witnessed by an ASME QEI-1 Certified Elevator Inspector.

   b. Government shall furnish electric power including necessary current for starting, testing, and operating machinery of each cartlift.

2. Contractor shall furnish the following test instruments and materials on-site and at the designated time of inspection: properly marked test weights, voltmeter, amp-meter and amp probe, thermometers, direct reading tachometer, and a means of two-way communication.
3. If during the inspection process the Inspector determines the need, the following instruments shall be available within a four-hour period: Megohm meter, vibration meter, sound meter, and a light meter.

B. Inspection of workmanship, equipment furnished, and installation for compliance with specifications.

C. Balance Tests: The percent of counterbalance shall be checked by placing test weights in car until the car and counterweight are equal in weight when located at the mid-point of travel. If the actual percent of counter balance does not conform to the specification, the amount of counterweight shall be adjusted until conformance is reached.

D. Full-Load Run Test: Cartlift shall be tested for a period of one hour continuous run with full contract load in the car. The test run shall consist of the cartlift stopping at all floors, in either direction of travel, for not less than five or more than ten seconds per floor.

E. Speed Test: The actual speed of the cartlift shall be determined in both directions of travel with full contract load, balanced load and no load in the cartlift. Speed shall be determined by applying a certified tachometer to the car hoisting ropes or governor rope. The actual measured speed of the cartlift with all loads in either direction shall be within three (3) percent of specified rated speed. Full speed runs shall be quiet and free from vibration and sway.

F. AMP TEST.

G. Car Leveling Test: Cartlift leveling devices shall be tested for accuracy of leveling at all floors with no load in car, balanced load in car and with contract load in car, in both directions of travel. Accuracy of floor level shall be within plus or minus 3 mm (1/8-inch) of level with any landing floor for which the stop has been initiated regardless of load in car or direction of travel. The car leveling device shall automatically correct over travel as well as under travel and shall maintain the car floor within plus or minus 3 mm (1/8-inch) of level with the landing floor regardless of change in load.

H. Brake Test: The action of the brake shall be prompt and a smooth stop shall result in the up and down directions of travel with no load and rated load in the elevator. Down stopping shall be tested with 125 percent of rated load in the cartlift.

I. Insulation Resistance Test: The cartlift complete wiring system shall be free from short circuits and grounds and the insulation resistance of the system shall be determined by use of megohm meter, at the discretion of the Inspector conducting the test.

J. Safety Devices and Governor Tests: The safety devices and governor shall be tested as required by ASME 17.1 Section 8.10.

K. Overload Devices: Test all overload current protection devices in the system at final inspection.

L. Limit Stops:

1. The position of the car when stopped by each of the normal limit stops with no load and with contract load in the car shall be accurately measured.
2. Final position of the cartlift relative to the terminal landings shall be determined when the cartlift has been stopped by the final limits. The lower limit stop shall be made with contract load in the cartlift. Cartlift shall be operated at inspection speed for both tests. Normal limit stopping devices shall be inoperative for the tests.

M. Setting of Car Door Contacts: The position of the car door at which the cartlift may be started shall be measured. The distance from full closure shall not exceed that required by ASME A17.1. The test shall be made with the hoistway doors closed or the hoistway door contact inoperative.

N. Setting of Interlocks: The position of the hoistway door at which the cartlift may be started shall be measured and shall not exceed ASME A17.1 requirements.

O. Operating and Signal System: The cartlift shall be operated by the operating devices provided and the operation signals and automatic floor leveling shall function in accordance with requirements specified. Starting, stopping and leveling shall be smooth and comfortable without appreciable steps of acceleration or deceleration.

P. Evidence of malfunction in any tested system or parts of equipment that occurs during the testing shall be corrected, repaired, or replaced at no additional cost to the Government, and the test repeated.

Q. If equipment fails test requirements and a re-inspection is required, the Contractor shall be responsible for the cost of re-inspection; salaries, transportation expenses, and per-diem expenses incurred by the representative of the Resident Engineer.

**3.9 INSTRUCTION OF VA PERSONNEL**

A. Provide competent instruction to VA personnel regarding the operation of equipment and accessories installed under this contract, for a period equal to one-eight hour day. Instruction shall commence after completion of all work and at the time and place directed by the Project Engineer.

B. Written instructions in triplicate relative to care, adjustments, and operation of all equipment and accessories shall be furnished and delivered to the Resident Engineer in independently bound folders. DVD recordings will also be acceptable. Written instructions shall include correct and legible wiring diagrams, nomenclature sheet of all electrical apparatus including location of each device, complete and comprehensive sequence of operation, complete replacement parts list with descriptive literature, and identification and diagrams of equipment and parts. Information shall also include electrical operation characteristics of all circuits, relays, timers, electronic devices, and related characteristics for all rotating equipment.

C. Provide supplementary instruction for any new equipment that may become necessary because of changes, modifications or replacement of equipment or operation under requirements of paragraph entitled "Warranty of Construction".

**3.10 INSPECTIONS AND SERVICE: GUANRANTEE PERIOD OF SERVICE**

A. Furnish complete inspection and maintenance service on entire cartlift installation for a period of one (1) year after completion and acceptance of all the cartlifts in this specification by the Resident Engineer. This maintenance service shall begin concurrently with the warranty. Maintenance work shall be performed by Certified Elevator Mechanics and Apprentices employed and supervised by the company that is providing guaranteed period of service on the cartlift equipment specified herein.

B. This contract will cover full maintenance including emergency call back service, inspections, and servicing the cartlifts listed in the schedule of elevators. The Elevator Contractor shall perform the following:
   1. Monthly systematic examination of equipment.
   2. During each maintenance visit the Elevator Contractor shall clean, lubricate, adjust, repair and replace all parts as necessary to keep the equipment in first class condition and proper working order.
   3. Furnish all lubricants, cleaning materials, parts and tools necessary to perform the work required. Lubricants shall be products recommended by the manufacturer of the equipment.
   4. Equalizing tension, shorten or renew hoisting ropes where necessary to maintain the safety factor.
   5. As required, motors, controllers, selectors, leveling devices, operating devices, switches on cars and in hoistways, hoistway doors and car doors or gate operating device, interlock contacts, guide shoes, guide rails, car door sills, hangers for doors, car doors or gates, signal system, car safety device, governors, tension and sheaves in pit shall be cleaned, lubricated and adjusted.
   6. Guide rails, overhead sheaves and beams, counterweight frames, and bottom of platforms shall be cleaned every three months. Car tops and machine room floors shall be cleaned monthly. Accumulated rubbish shall be removed from the pits monthly. A general cleaning of the entire installation including all machine room equipment and hoistway equipment shall be accomplished quarterly. Cleaning supplies and vacuum cleaner shall be furnished by the Contractor.
   7. Maintain the performance standards set forth in this specification.
   8. The operational system shall be maintained to the standards specified hereinafter including any changes or adjustments required to meet varying conditions of hospital occupancy.
   9. Maintain smooth starting and stopping and accurate leveling at all times.

C. Maintenance service shall not include the performance of work required as a result of improper use, accidents, and negligence for which the Elevator Contractor is not directly responsible.

D. Provide 24 hour emergency call-back service that shall consist of promptly responding to calls within two hours for emergency service

should a shutdown or emergency develop between regular examinations. Overtime emergency call-back service shall be limited to minor adjustments and repairs required to protect the immediate safety of the equipment and persons using the cartlift.

E. Service and emergency personnel shall report to the Project Engineer or his authorized representative upon arrival at the hospital and again upon completion of the required work. A copy of the work ticket containing a complete description of the work performed shall be given to the Project Engineer.

F. The Elevator Contractor shall maintain a log in the machine room. The log shall list the date and time of all monthly examinations and all trouble calls. Each trouble call shall be fully described including the nature of the call, necessary correction performed or parts replaced.

G. Provide written “Maintenance Control Program” that shall be in place to maintain the equipment in compliance with ASME A17.1 Section 8.6.

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