BID PACKAGE

PART IV

SPECIFICATIONS

DMH Project#2018-081
Food Service Improvements – Glass Bldg.
Taunton State Hospital
Taunton, MA 02780

edm

architecture ● engineering ● management

pittsfield, ma unionville, ct

888-336-6500

project manual:

commonwealth of massachusetts

department of mental health
taunton state hospital
food service improvements

60 hodges avenue, taunton, ma 02780

dcm-4163

eohhs project no: EHS1801 TR1

december 6, 2017

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE FOR ADMINISTRATION AND FINANCE
DIVISION OF CAPITAL ASSET MANAGEMENT AND MAINTENANCE
OFFICE OF PLANNNIING, DESIGN, AND CONSTRUCTION

SPECIFICATIONS FOR
MASSACHUSETTS STATE PROJECT NO. MBC1601-HC1

Taunton State Hospital
Food Service Improvements
60 Hodges Avenue, Taunton, Massachusetts

DATE: December 6, 2017

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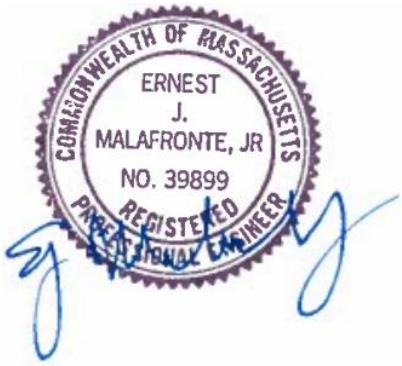

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DIVISION OF CAPITAL ASSET MANAGEMENT AND MAINTENANCE
THE COMMONWEALTH OF MASSACHUSETTS

STANDARD SPECIFICATIONS – MGL CHAPTER 149 - DESIGN-BID-BUILD PROJECTS

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SECTION 011000

SUMMARY

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Equality of material, article, assembly or system other than those named or described in this Section shall be determined in accordance with the provisions of Article V of the CONTRACT AND GENERAL CONDITIONS.

1.2 REQUIREMENTS INCLUDED

A. Work under this Contract.

B. Examination of Site and Documents.

C. General Contractor’s Qualifications.

D. Contract Method.

E. Work Sequence.

F. Supervision of Work.

G. General Contractor’s Use of Premises.

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M. Permits, Inspection, and Testing Required by Governing Authorities.

N. Cutting, Coring, Patching, Unless Otherwise Indicated.

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S. Damage Responsibility.

T. Owner Furnished Products.

U. User Agency Occupancy.

V. Asbestos and Hazardous Materials Discovery.

W. Special Requirements.

X. List of Drawings.

1.3 WORK UNDER THIS CONTRACT

A. The work to be done under this contract consists of executing and completing all work required for Massachusetts State Project EHS1801-TR1, Taunton State Hospital – Food Service Improvements, Taunton State Hospital, 60 Hodges Avenue, Taunton, Massachusetts 02780.

1. General Information

a. The project consists of demolition and interior kitchen renovations, flooring and kitchen equipment replacement and improvements at the Glass Building kitchen.

B. The work will include all operations necessary to deliver the renovations ancillary on-site amenities in a fully installed and operable condition including all utility work and obtaining all necessary licenses, permits, and certificates. Where utilities exist within the building, and are known by the Owner, they have been shown on the plans appearing in, but not restricted to, the documents. Connections to these existing utility lines will be the responsibility of the appropriate Sub Contractor.

C. The scope of work, without limiting the generality thereof, includes all labor, materials, equipment and services required to perform the work described fully in the Drawings and Specifications and includes, but is not limited to the following major work:

1. Renovations of the kitchen and related areas including, but not limited to:
   a. Temporary utilities.
   b. Demolition.
   c. Resinous Flooring.
   d. Fire-Safing and Sealants.
   e. Plumbing.
   f. Electrical.
   g. Kitchen Equipment

D. Reference to Drawings: The work to be done under this Contract is shown on the Drawings listed at the end of this Section.

E. The Massachusetts Standard Labor Wage rates, as outlined in the exhibits, will be used in the construction of this project.

1.4 EXAMINATION OF SITE AND DOCUMENTS

A. A pre-bid conference will be held at the job site on the date and at the time indicated in the Invitation to Bid.

B. Bidders shall visit the site on a non-holiday weekday acceptable to the User Agency and the DCAMM Project Manager, between the hours of 9:00 AM and 3:00 PM to visually inspect the location of the work and existing conditions that may affect new work.

C. The bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which the work is to be carried out. The Commonwealth will not be responsible for errors, omissions, and/or charges for extra work arising from the General Contractors or Subcontractors failure to familiarize themselves with the contract documents. The General Contractor and Subcontractor acknowledge that they are familiar with the conditions and requirements of the contract documents where they require, in any part of the work a given result to be produced, and that the contract documents are adequate and will produce the required results.

D. Contact: Ken Lortie - EOHHS Project Manager (508) 977-3311.

1.5 GENERAL CONTRACTOR'S QUALIFICATION

A. The General Contractor must be currently certified by the Division of Capital Asset Management and Maintenance (DCAMM) for General Building Construction.

B. The General Contractor shall certify in writing that he has successfully performed on at least three new construction projects of equivalent size and complexity.

C. It is the Bidder's responsibility to obtain the necessary forms from DCAMM and make application to DCAMM not less than three weeks prior to advertised bid opening for DCAMM to evaluate the application and issue a Certificate of Eligibility.

D. The General Contractor's Updated Statement is not a public record as defined in M.G.L., Chapter 4, Section 7, and will not be open to public inspection.

1.6 CONTRACT METHOD

A. Work under this contract shall be lump sum price, for the scopes of work as described in these specifications and shown on the Drawings.

1.7 WORK SEQUENCE

A. The Work will be conducted in the following sequence of demolition/construction:

1. All work is to be coordinated with DCAMM and Taunton State Hospital staff to accommodate continued use of the building by the Taunton State Hospital Community during construction.

1.8 SUPERVISION OF WORK

A. The General Contractor shall be held directly responsible for the correct installation of all work performed under this Contract. The General Contractor must make good repair, without expense to the Commonwealth, of any part of the new work, or existing work to remain, which may become inoperative on account of leaving the work unprotected or unsupervised during construction of the system or which may break or give out in any manner by reason of poor workmanship, defective materials or any lack of space to allow for expansion and contraction of the work during the General Contractor's warranty period, from the date of final acceptance of the work by the Division of Capital Asset Management and Maintenance (DCAMM).

B. The General Contractor shall furnish a competent Massachusetts licensed superintendent satisfactory to the DCAMM Project Manager and to the Designer. The licensed superintendent shall supervise all work under this contract and who shall remain on duty at the site throughout the Contract period while work is in progress.

1. Submit the name and resume of the superintendent for approval to the DCAMM Project Manager. Include experience with projects of equal size and complexity.

1.9 GENERAL CONTRACTOR’S USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated within the construction fence shown on the site drawing(s). Coordinate work of all Subcontractors required outside the construction fence boundary shown on the site drawing(s). Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public (if applicable).
2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner’s employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Schedule and perform work to afford minimum of interruption to normal and continuous operation of utility systems. The General Contractor shall submit to DCAMM and the Designer for approval, proposed schedule for performing work; including construction of new utilities, re-routing of existing utilities and final connection of new work to existing work. Schedule shall indicate shutdown time required for each operation.

1. Work includes checking all safety devices to verify that they have come back on-line after interruption. This requirement will not be waived.

C. The General Contractor shall notify the DCAMM and Operating Agency in writing, 72 hours in advance of the proposed time for shutting down or interrupting any utilities, services or facilities which may affect the operation of other buildings, services or facilities of the Operating Agency.

D. Coordinate with DCAMM and the Designer, work in connection with adjacent driveways, walks, or other facilities which would prevent access thereto or interrupt, restrict, or otherwise infringe upon the Operating Agency's use thereof.

E. The General Contractor shall be aware of the sensitivity of the neighborhood organizations to noise, dust, debris, vibration, and site maintenance and take appropriate precautions to avoid conflict.

F. Damage to existing work, if caused by the General Contractor's operations under this Contract, shall be repaired at the General Contractor's expense.

1. An existing conditions survey shall be conducted, with the Designer, the DCAMM Project Manager, and User Agency representatives, at which existing conditions will be videotaped by the General Contractor. A copy of the videotape will be provided to the DCAMM Project Manager.

G. Trenching and other work outside construction limits shall be expedited to fullest extent and carried out with minimum of inconvenience to normal operation of the Operating Agency and public traffic. Walks, paved or landscaped areas over which temporary driveways cross, shall upon completion of the work, be restored to their original condition. Temporary roadways shall be bridged over trenched areas. Filing is required for a DCAMM issued trench permit.

H. The General Contractor can gain access to the premises during the hours specified below. In addition, the General Contractor and his personnel will limit themselves only within the working premises during working hours. If work needs to be scheduled during times other than those listed below, General Contractor shall inform the DCAMM Project Manager one week prior to work.

1. Deliveries: 6:00 AM – 3:30 PM.
2. General Contractor Access: 7:00 AM – 4:30 PM.

I. Confine operations at the site to areas permitted by:

1. Laws
2. Ordinances
3. Permits
4. Contract Documents
5. Owner's Regulations

J. If required by User Agency or the DCAMM Project Manager, workers will be required to wear identifying name badges. In secure areas, submit names of workers for clearing by the DCAMM Project Manager.

K. General Contractor shall supervise the use of the site related to construction and be responsible for correcting any damage identified by the DCAMM Project Manager to the DCAMM Project Manager's satisfaction.

1. An existing conditions survey shall be conducted, with the Designer, The DCAMM Project Manager, and User Agency representatives, at which existing conditions will be videotaped by the General Contractor. A copy of the videotape will be provided to the DCAMM Project Manager.

L. All available existing utilities adjacent to the construction site will be available for use during construction unless indicated otherwise. Temporary connections to these utilities, all metering, transformers, removal, usage, and their associated costs will be the responsibility of the appropriate Subcontractor.

1. Utilities Available for use During Construction: Electrical power, water and sanitary facilities, subject Owner approval and proper use.

M. The General Contractor shall verify that Subcontractors have visited the site and included all costs associated with the location of the project, and any restriction or limitations the location of the project may pose.

N. The Subcontractors shall at all times conduct their operations in a courteous, professional manner while on the project or in the vicinity of the project. Harassment, offensive language or behavior will not be permitted on the site.

1.10 COORDINATION

A. The General Contractor shall be responsible for the proper fitting of all the work and for the coordination of the operations of all Subcontractors or material and persons engaged upon the work. The General Contractor shall do, or cause his agents to do, all cutting, fitting, adjusting, and repair necessary in order to make the several parts of the work come together properly.

1. Examine Contract Documents in advance of start of construction and identify in writing questions, irregularities or interference to the DCAMM Project manager in writing. Failure to identify and address such issues in advance becomes the sole responsibility of the General Contractor. A conflict that would cause the reduction of the normal ceiling height of any occupied space is considered to be an interference.

B. Execute the work in an orderly and careful manner with due regard to the occupants of the facility, the public, the employees, and the normal function of the facility.

C. The work sequence shall follow planning and schedule established by the General Contractor as approved by the Designer and the DCAMM Project Manager. The work upon the site of the project shall commence promptly and be executed with full simultaneous progress. Work operations which require the interruption of utilities, service, and access shall be scheduled so as to involve minimum disruption and inconvenience, and to be expedited so as to insure minimum duration of any periods of disruption or inconvenience.

D. The General Contractor shall review the tolerances established in the specifications for each type of work and as established by Subcontractor organizations. The General Contractor shall coordinate the various Subcontractors and resolve any conflicts that may exist between Subcontractor tolerances without additional cost to DCAMM. The General Contractor shall provide any chipping, leveling, shoring or surveys to ensure that the various materials align as detailed by the Designer and as necessary for smooth transitions not noticeable in the finished work.

1.11 FIELD ENGINEERING

A. Provide field engineering services; establish grades, lines and levels, by use of recognized engineering survey practices. All field engineering surveying shall be performed by a licensed Land Surveyor registered in the Commonwealth of Massachusetts.

B. The General Contractor shall survey and submit exact dimensional layouts as required. Engage and pay for the services of a Massachusetts Registered Surveyor acceptable to the DCAMM Project Manager to locate and protect control and reference points.

1.12 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements for the standard, except where more rigid requirements are specified or are required by codes. Refer to Section 014200 - REFERENCES.

B. Where reference is made in the Contractual Documents to Publications and Standards issued by Associations or Societies, the intent shall be understood to specify the current edition of such Publications or Standards (including tentative revision) in effect on the date of the contract advertisement notwithstanding any reference to a particular date.

1.13 PRE-CONSTRUCTION CONFERENCE

A. In accordance with Article V of the CONTRACT AND GENERAL CONDITIONS, a pre-construction conference to review the work will be conducted by the DCAMM Project Manager.

B. Representatives of the following shall be required to attend this conference:

1. DCAMM
2. Designer
3. User Agency
4. General Contractor
5. All Subcontractors
6. Applicable Municipal Agencies

C. The General Contractor shall have a responsible representative at the pre-construction conference to be called by the DCAMM Project Manager following the award of the contract, as well as representatives of field or office forces and major Subcontractors. All such

representatives shall have authority to act for their respective firms. The pre-construction conference is to be held within five days of Notice to Proceed, or as otherwise determined by DCAMM.

1.14 PROJECT MEETINGS

A. Project meetings shall be held on a weekly basis and as required subject to the discretion of the DCAMM Project Manager.

B. As a prerequisite for monthly payments, ordering schedules, shop drawing submitted schedules, and coordination meeting schedules shall be prepared and maintained by the General Contractor and shall be revised and updated on a monthly basis, and a copy shall be submitted to the DCAMM Project Manager and Designer.

C. In order to expedite construction progress on this project, the General Contractor shall order all materials immediately after the approval of shop drawings and shall obtain a fixed date of delivery to the project site for all materials ordered which shall not impede or otherwise interfere with construction progress. The General Contractor shall present a list and written proof of all materials and equipment ordered (through purchase orders). Such list shall be presented at the meetings and shall be continuously updated.

D. Scheduling shall be discussed with all concerned parties, and methods shall be presented by the General Contractor, which shall reflect construction completion not being deferred or foreshortened. Identify critical long-lead items and other special scheduling requirements. The project schedule is to include time for submission of shop drawing submittals, time for review, and allowance for resubmittal and review.

E. Project meetings shall be chaired by the General Contractor.

F. Minutes of the project meetings shall be prepared by the General Contractor and shall be distributed to all present. The General Contractor’s meeting minutes shall be the only official meeting record.

1.15 PERMITS, INSPECTION, AND TESTING REQUIRED BY GOVERNING AUTHORITIES

A. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having any jurisdiction require any portion of the Work to be inspected, tested, or approved, the General Contractor shall give the Designer, the DCAMM Project Manager or his/her designated representative, and such Authority timely notice (5 business days minimum) of its readiness so the Designer may observe such inspecting, testing, or approval.

B. Prior to the start of construction, the General Contractor shall complete application to the applicable Building Code enforcement authority for a Building Permit. Such Permit shall be displayed in a conspicuous location at the project site.

C. Unless otherwise specified under the Sections of the Specifications, the General Contractor shall pay such proper and legal fees to public officers and others as may be necessary for the due and faithful performance of the work and which may arise incidental to the fulfilling of this

Contract. As such, all fees, charges, and assessments in connection with the above shall be paid by the General Contractor

D. The General Contractor shall maintain at the site, for the duration of construction operations, at least one (1) up-to-date copy of all relevant codes and standards listed in the Contract Documents or determined to be applicable to the work. One (1) copy of such codes shall be for the exclusive use of DCAMM and the Designer and its Consultants, and shall be kept in the General Contractor's site office.

E. The General Contractor shall furnish and install all information required by the building official and shall secure the general building permit for the work promptly on award of the Contract. The General Contractor shall conform to all conditions and requirements of the permit and code enforcement authority. The General Contractor shall provide names and license numbers of its responsible representatives to complete the application for permit, and shall receive the permit and promptly distribute copies to DCAMM and the Designer.

F. General Contractor and specialized Subcontractors as applicable shall identify all permits (other than general building permit) required from Authorities having jurisdiction over the Project for the construction and occupancy of the work. The General Contractor shall prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner, and shall furnish the required information to the Building Official and obtain the required permits as early as practicable after award of the Contract.

1. The General Contractor shall display all permit cards as required by the Authorities, and shall deliver legible photocopies of all permits to DCAMM's Project Manager and the Designer promptly upon their receipt.
2. The General Contractor shall arrange for all inspections, testing and approvals required for all permits, and shall notify the Designer and DCAMM's Resident Engineer of such inspections at least three (3) business days in advance (longer if so required in the various Sections of the Specifications), so they may arrange to observe.
3. The General Contractor shall comply with all conditions and provide all notices required by all permits.
4. The General Contractor shall perform and/or arrange for and pay all testing and inspections required by the Governing Codes and Authorities, other than those provided by DCAMM, and shall notify the Designer and DCAMM's Resident Engineer of such inspections at least three (3) business days in advance of all such testing or inspection, so they may arrange to observe.
5. Where Inspecting Authorities require corrective work for conformance with applicable Codes and Authorities, the General Contractor shall promptly comply with such requirements, except in cases where such requirements clearly exceed the requirements of the Contract Documents, in which case the General Contractor shall proceed in accordance with the procedures for modifications or changes in the work established in the Contract Documents, as amended.

1.16 CUTTING, CORING, AND PATCHING, UNLESS OTHERWISE INDICATED

A. The General Contractor shall coordinate all cutting, coring, fitting and patching of the work that may be required to make its several parts come together properly and fit it to receive or be

received by work of the Subcontractors shown on the Drawings and Specifications. The General Contractor shall perform all cutting, coring or patching.

B. The General Contractor shall coordinate that the work of the Subcontractor is not endangered by any cutting, coring, excavating, or otherwise altering of the work and shall not allow the cutting or altering the work of any Subcontractor except with the written consent of the Designer.

C. Submit a written request to Designer well in advance of executing any cutting or alteration which affects:

1. Work of DCAMM or separate Contractor.
2. Structural value or integrity of any element of the Project.
3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
4. Efficiency, operational life, maintenance, or safety of operational elements.
5. Visual qualities of sight-exposed elements.
6. Request shall include:
    a. Identification of the Project.
    b. Description of affected work.
    c. The necessity for cutting, alteration, or excavation.
    d. Effect on work of DCAMM or any separate General Contractor, or on structural or weatherproof integrity of Project.
    e. Description of proposed work:
    f. Alternatives to cutting and patching.
    g. Cost proposal, when applicable.
    h. Written permission of any separate General Contractor whose work will be affected.
7. Should conditions of Work or the schedule indicate a change of products from original installation, General Contractor shall submit request for substitution.
8. Submit written notice to Designer designating date and time the work will be uncovered a minimum of three business days in advance.

D. Performance:

1. Execute cutting and patching by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
    a. In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.
    b. Comply with the requirements of Section 312000 - EARTH MOVING where cutting-and-patching requires excavating and backfilling.
    c. Prior to cutting and structural steel or concrete work, contact Designer and Project Structural Engineer in writing. Do not cut any structural steel and concrete work until approval has been granted by the Designer and the Project Structural Engineer.
2. Employ original installer or fabricator to perform cutting and patching for:
    a. Weather-exposed or moisture-resistant elements.
    b. Sight-exposed finished surfaces.
3. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

4. Restore work which has been cut or removed; install new products matching existing to provide completed Work in accordance with requirements of Contract Documents.
5. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
6. Patch with seams which are durable and as invisible as possible. Flash and seal all penetration of exterior work. Comply with specified tolerances for the work.
7. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.
    a. Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch.
8. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
    a. For continuous surfaces, refinish to nearest intersection.
    b. For an assembly, refinish entire unit.

E. Existing Utilities Services:

1. Interruptions to critical existing utility services will not be allowed.
    a. Sanitary sewer, storm drainage, and water changeovers as affecting existing services shall be done with no disruptions of existing services and scheduling of such work will require approval in writing by the User Agency.
    b. All relocation of existing electrical, telephone, and gas services that are utility company owned shall be performed by the respective utility company, and the cost of any charges for such work shall be paid by the General Contractor. All utility installations and relocation shall be the responsibility of the General Contractor. Coordination of all of the aforesaid work is the responsibility of the General Contractor.
2. The General Contractor shall locate and record on Drawings all existing utilities along the course of the work by such means as the Designer and the DCAMM Project Manager may approve, and shall preserve such marked locations until the work has progressed to the point where the encountered utility is fully exposed and protected as required. It shall be the General Contractor’s responsibility to notify the proper authorities and/or utility company before interfering therewith.
3. Existing utilities that are indicated on the Drawings or whose locations are made known to the General Contractor prior to excavations, though accuracy and information as to grades and elevations may be lacking, shall be protected from damage during the excavation and backfilling operations and, if damaged by the General Contractor, it shall be repaired by the General Contractor at his/her own expense.
4. All exposed conduits, wires, and/or cables shall be provided with sufficient protection and support to prevent failure, fraying, or damage due to backfilling or other construction operations.
5. The General Contractor shall not obstruct access to existing active utility system manholes and catch basins which continue to serve facilities other than the project construction site. The General Contractor shall exercise measures as necessary to prevent the placement of impediments that limit continuous access by authorized utility company or User Agency maintenance personnel and shall be required to reimburse the utility company or User Agency for any expense incurred as a result of need to remove any such impediments to access.

F. Dig-Safe:

1. Within the Commonwealth, "Dig-Safe" (Dig Safe Systems, Inc.) is the name of the Utility Underground Plant Damage Prevention Authority. They are located at 331 Montvale Avenue; Woburn, MA 01801. The telephone number is 1-888-DIGSAFE (344-7233). General Contractors must notify "Dig-Safe" of contemplated excavation, demolition, or explosive work in public or private ways, and any utility company right-of-way easement. Notification must be made at least seventy-two (72) hours prior to the work, but not more than sixty (60) days before the contemplated work.
2. The Owner requires that notification be sent to "Dig-Safe" by certified mail with copies to the Designer and the DCAMM Project Manager. The Owner requires a copy of the signed receipt of delivery.
3. "Dig-Safe" is required to respond to the notice within seventy-two (72) hours from the time said notice is received by designating at the locus the location of pipes, mains, wires, or conduits.
4. General Contractors shall not commence with work until "Dig-Safe" has responded as noted above.
5. Prior to the "Dig-Safe" notification, the Owner requires General Contractors to provide their Superintendent with current "Dig-Safe" regulations, and a copy of Massachusetts General Laws, Chapter 82, Section 40.

1.17 DEBRIS REMOVAL

A. The General Contractor shall coordinate the removal of all demolition and construction waste by the Subcontractor from the job site on a daily basis. Waste shall be segregated for recycling. Comply with requirements of Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Debris shall be legally disposed of in a D.E.P. approved disposal site. The site to be used shall be submitted to and approved by the DCAMM Project Manager prior to the start of construction. All required dumping permits shall be obtained prior to start of construction. General Contractor shall submit receipts from the disposal site(s) as evidence of legal disposal. The Subcontractor shall pay the cost of any charges for debris removal.

C. The General Contractor shall bear responsibility for maintaining the building and site clean and free of debris, leaving all work in clean and proper condition satisfactory to DCAMM and the Designer. The General Contractor shall ensure that each of the Subcontractors clean up during and immediately upon completion of their work. Clean up includes the following tasks:

1. Remove all rubbish, waste, tools, equipment, appurtenances caused by and used in the execution of work.

D. Prevent the accumulation of debris at the construction site, storage areas, parking areas, and along access roads and haul routes.

E. Provide containers for deposit of debris and schedule periodic collection and disposal of debris.

F. Prohibit overloading of trucks to prevent spillage on access and haul routes.

G. The General Contractor shall be responsible for proper disposal of all construction debris leaving the site.

1.18 FIELD MEASUREMENTS

A. Although care has been taken to ensure their accuracy, the dimensions shown for existing items and structures are not guaranteed. It is the responsibility of the General Contractor to verify these dimensions in the field before fabricating any construction component. No claims for extra payment due to incorrect dimensions will be considered by the Commonwealth.

1.19 SAFETY REGULATIONS

A. This project is subject to compliance with Public Law 91 596 "Occupational Safety and Health Act" latest edition (OSHA 29 CFR 1926), with respect to all rules and regulations pertaining to construction, including Volume 36, numbers 75 and 105, of the Federal Register, as amended, and as published by the U.S. Department of Labor.

B. Submit the name of the General Contractor's safety officer to the DCAMM Project Manager. Submit copies of safety reports to the DCAMM Project Manager monthly.

C. All accident reports are to be transmitted to the Resident Engineer within 24 hours of occurrence.

1.20 OSHA SAFETY AND HEALTH COURSE DOCUMENTATION

A. OSHA Safety and Health Course Documentation Records: Chapter 306 of the Massachusetts Acts of 2004 requires that everyone employed at the jobsite must complete a minimum 10-hour long course in construction safety and health approved by the U.S. Occupational Safety and Health Administration (OSHA) prior to working at the jobsite. Compliance is required of General Contractors' and Subcontractors' on-site employees at all levels whether stationed in the trailer or working in the field. Unless the Massachusetts Attorney General's office indicates otherwise, this requirement does not apply to home-office employees visiting the site or to suppliers' employees who are making deliveries.

B. Documentation records shall be initially compiled by the General Contractor and Subcontractors as part of their certified payrolls, and the General Contractor shall create and maintain a copy of the documentation on site at all times. On-site documentation shall be filed in alphabetical order and immediately available to DCAMM's Project Manager and OSHA inspectors. Fines imposed for non-compliance shall be promptly paid by the General Contractor at no additional expense to DCAMM. Delays in the progress of the Work caused by such non-compliance will not be acceptable as the basis for an extension of contract time or change order request.

1.21 DAMAGE RESPONSIBILITY

A. The General Contractor shall repair, at no cost to DCAMM, any damage to building elements, site appurtenances, landscaping, utilities, etc. caused during demolition operation and work of this Contract.

1.22 OWNER FURNISHED PRODUCTS

A. Products indicated “N.I.C.” (Not in Contract), or “E. O.” (Equipment by Owner), or “O.F.O.I.” (Owner Furnished Owner Installed), or other similar acronyms as defined in the contract documents will be furnished and installed by the Owner. Coordination and provision of service lines for such products shall be included under these Construction Contract Documents, if indicated. Final connections from service lines to equipment will be by the Owner, unless otherwise indicated

1.23 USER AGENCY OCCUPANCY

A. Beneficial Use and Occupancy: Refer to requirements in Section 017700 - CONTRACT CLOSEOUT, Par. 1.6.

B. Use and Occupancy: When the project is Substantially Complete (with all work affecting health, safety, and function totally completed, and with less than one percent (<1%) of the contract value remaining) and ready for Use and Occupancy as determined by the Designer, the DCAMM Project Manager and the Operating Agency, then the User Agency will take control of their building area(s) and be responsible for operating costs and security.

1.24 ASBESTOS AND HAZARDOUS MATERIALS DISCOVERY

A. If unanticipated asbestos-containing materials or other Hazardous Materials not included in Contract are discovered at any time during the course of work, the General Contractor shall cease work in the affected areas only and continue work in other areas, at the same time notify DCAMM and the Designer of such discovery. Do not proceed with work in such affected areas until written instructions are received. If removal is required, payment will be made in accordance with the contract unit prices bid for each respective material. In the absence of unit prices, costs shall be negotiated or otherwise established prior to commencement of removal, in accordance with provisions of the Contract.

1.25 SPECIAL REQUIREMENTS

A. The General Contractor shall prepare a Health and Safety Plan that addresses protection of employee and public health and safety. The minimum contents of the Plan are specified in Section 013300 – SUBMITTAL REQUIREMENTS.

B. The General Contractor shall be solely responsible for implementing the procedures specified in the Plan.

C. The General Contractor shall make available complete sets of personal protective equipment and clothing to DCAMM for use during site observations/inspections by DCAMM and the Designer. These shall be supplied and maintained at no cost to DCAMM and the Designer, and shall be returned to the General Contractor upon the completion of work, except for disposable protective clothing.

1. The General Contractor shall provide a repository for collection and disposal of health and safety materials. Collection and disposal of contaminated disposable supplies shall be at no additional cost.

1.26 CORE DRILLING

A. Do not core new concrete structure without written approval from the Structural Engineer.

B. X-ray floor prior to core drilling to determine location of re-bar, conduit, or other conflicts with the floor construction. Contractor is responsible for repair of damaged utilities.

C. Perform all core drilling required for the proper installation of this Section. Locate all required openings and prior to coring. Coordinate the opening with the other Trades and obtain approval from the Structural Engineer.

D. Thoroughly investigate the existing conditions in the vicinity of the required opening prior to cutting. Take care so as not to disturb the existing building systems. Damage to existing conditions incurred during core drilling shall be corrected to DCAMM's Project Manager's satisfaction with no additional expense to the DCAMM.

1.27 LIST OF DRAWINGS

A. GI-101 GENERAL INFORMATION

B. AD-101 DEMOLITION PLAN

C. A-101 KITCHEN PLAN

D. PD-101 PLUMBING DEMOLITION PLANS

E. P-101 PLUMBING PROPOSED WORK PLANS

F. E-001 ELECTRICAL NOTES & LEGENDS

G. ED-101 ELECTRICAL DEMOLITION PLAN

H. E-101 PARTIAL ELECRICAL FIRST FLOOR PLAN

I. E-102 PARTIAL ELECTRICAL FIRST FLOOR POWER PLAN – TEMPORARY KITCHEN

J. E-201 ELECTRICAL PANEL SCHEDULES

K. K-101 FOODSERVICE UTILITY SCHEDULE AND EQUIPMENT PLAN

L. K-102 FOODSERVICE UTILITY SCHEDULE AND BUILDING CONDITIONS PLAN

M. K-103 FOODSERVICE UTILITY SCHEDULE AND PLUMBING PLAN

N. K-104 FOODSERVICE UTILITY SCHEDULE AND ELECTRICAL PLAN

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012200

UNIT PRICES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 REQUIREMENTS INCLUDED

A. Unit pricing shall be performed by the General Contractor and/or Subcontractor as applicable.

B. Unit price work will be paid for in accordance with unit prices listed by the General Contractor, based on estimated quantities calculated by the Designer.

C. All unit prices shall include their pro-rata share of all costs for overhead, profit, bond, labor, materials, disposal, and equipment to perform the work item complete, as identified.

D. Unit Price Proposal Sheets shall be included with Subcontractor form for bid when applicable.

E. The total amount of all unit price work shall be included in the amount to be entered in applicable bid forms.

F. Unit Prices shall provide for a variance in quantities of plus or minus 100 percent of those listed on the Unit Price Proposal Sheet.

G. If quantities exceed the units established in the contract, including the aforesaid overage percentage, an equitable unit price adjustment will be determined by the DCAMM Project Manager.

H. A change order will be initiated by the DCAMM Project Manager to adjust the contract price resulting from the final quantities of the unit price work.

I. The University reserves the right to reject the Contractor’s measurement of work-in-place that involves use of established unit prices, and to have the Work measured by an independent surveyor acceptable to the Contractor at the University’s expense. Earthwork quantities shall be measured based on in-place lines and grades and not on delivered truck yardages or tonnages. The University shall be the final authority as to measurement of work in place.

1.3 UNIT PRICES

A. Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those required by the Contract Documents, by authorization of DCAMM, the below unit prices shall, at the option of DCAMM, be the basis of payment to the General Contractor or credit to DCAMM, for such increase or decrease in the work. The Unit Prices shall represent the exact net amount per unit to be paid the General Contractor (in the case of additions or increases) or to be refunded DCAMM (in the case of decreases). No additional adjustment will be allowed for overhead, profit, insurance, or other direct or indirect expenses of the General Contractor or Subcontractors. No additional adjustments will be allowed for over excavation, over-blasting, or other work without the prior written approval of the DCAMM Project Manager. All unit price quantities are over and above the work required to complete the work under the Base Bid.

	Item Description	Quantity
1.	Floor Penetrations: Cleaning, preparation and placement of fire-safing, backer rod and filler/sealer at floor penetrations.	30

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. Without limitations, coordination will include Critical Path Method Scheduling (CPM), coordination of submittals, coordination of all elements of the Work, and coordination of contract closeout.

B. Description:

1. Coordinate scheduling, submittals, and work of the various Subcontractors and elements of the Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
2. Coordinate sequence of the Work to accommodate User Agency Partial (Beneficial) Occupancy.

C. Meetings:

1. In addition to progress meetings, hold coordination meetings and pre-installation conferences with personnel and Subcontractors to assure coordination of the Work.

D. Coordination of Submittals:

1. Schedule and coordinate submittals.
2. Coordinate work of various Subcontractors having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
3. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other Subcontractors,

1.5 MECHANICAL AND ELECTRICAL COORDINATION DRAWINGS

A. Cause to be prepared and submit to the General Contractor, coordination drawings for site utilities and building(s), for Designer and the DCAMM Project Manager’s review.

B. Sequence of Coordination Drawings preparation shall be as follows:

1. Coordination Drawings: The General Contractor shall be fully responsible for coordinating all Subcontractors, coordinating construction sequences and schedules, and coordinating the actual installed location and interface of all work. Before materials are fabricated or the Work begun, the General Contractor shall supervise and direct the creation of one (1) complete set of Coordination Drawings showing the complete coordination and integration of all Work of this Project including, but not limited to, structural, architectural, mechanical, plumbing, fire protection, and electrical disciplines. Coordination Drawings are intended to assist the General Contractor during construction and shall not be used for "shop drawings", "record drawings", or any other required submittal.
    a. Base Sheets: The General Contractor shall prepare and provide one accurately scaled set of building coordination drawing "base sheets" on reproducible transparencies or electronic format showing all architectural and structural work. Base sheets shall be at 1/4-inch scale, except congested areas and sections through vertical shafts shall be at 3/8-inch scale.
    b. HVAC: The General Contractor shall circulate the coordination drawing base sheets to the HVAC Subcontractor and require the HVAC Subcontractor to accurately and neatly show the actual size and location of all HVAC equipment and work. Ductwork shall be drawn to scale with full dimensions indicated graphically. Single line diagrams are not acceptable. The HVAC Subcontractor shall note any apparent conflicts, suggest alternate solutions, and return the coordination drawings to the General Contractor.
    c. Plumbing: The General Contractor shall circulate the coordination drawings to the Plumbing Subcontractor and require the Plumbing Subcontractor to accurately and neatly show the actual size and location of all plumbing equipment and work. The Plumbing Subcontractor shall note any apparent conflicts, suggest alternate solutions, and return the coordination drawings to the General Contractor. Sloped plumbing lines have right of way.
    d. Electrical: The General Contractor shall circulate the coordination drawings to the Electrical Subcontractor and require the Electrical Subcontractor to accurately and neatly show the actual size and location of all electrical equipment and work. The Electrical Subcontractor shall note any apparent conflicts, suggest alternate solutions, and return the coordination drawings to the General Contractor.
    e. Fire Protection: The General Contractor shall circulate the coordination drawings to the Fire Protection Subcontractor and require the Fire Protection Subcontractor to accurately and neatly show the actual size and location of all electrical equipment and work. The Fire Protection Subcontractor shall note any apparent conflicts, suggest alternate solutions, and return the coordination drawings to the General Contractor.
    f. Other Subcontractors: The General Contractor shall circulate the coordination drawings to other Subcontractors whose work might conflict with other work and require these Subcontractors to accurately and neatly show the actual size and location of all their equipment and work. These Subcontractors shall note any apparent conflicts, suggest alternate solutions, and return the coordination drawings to the General Contractor.
    g. After each Subcontractor completes its drawings, a meeting will be held to resolve conflicts between the Subcontractors.
        1) Coordination drawings shall be prepared at not less than 1/4-inch scale, and electronic AutoCAD files of same.

2) Submit drawings to the General Contractor for Designer's review prior to starting any installations.
3) Items of impossibility or request for variance shall be called to the General Contractor's attention for the Designer's resolution.

h. General Contractor Review and Submission: The General Contractor shall carefully review, modify and approve coordination drawings in cooperation with the Subcontractors to assure that conflicts, if any, are resolved before work in the field is begun and to ensure that the location of work exposed to view is as indicated or as approved by the Designer and the DCAMM Project Manager.
1) Prior to submittal of the coordination drawings, the Subcontractors shall affix their signatures to the drawings.
2) Clearly indicate conflicts requiring modification to the general appearance or the function of the project for Designer and DCAMM Project Manager's reviews, and approvals.
3) The General Contractor shall stamp, sign and submit the coordination drawing originals to the Designer for review and approval, with one (1) paper copy and one (1) additional electronic copy on compact disk to the DCAMM Project Manager, following the specified procedures and policies outlined in Section 013300 – SUBMITTAL REQUIREMENTS. In no case shall acceptance of coordination drawings be interpreted as a release of General Contractor of responsibility to fulfill all of the requirements of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300

SUBMITTAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 REQUIREMENTS INCLUDED

A. Shop drawings, products data, samples, submittal logs (shop drawings and samples, RFI, NOI, PCO, CO and SK drawings), weather protection (if applicable) and schedule of values.

1.3 SHOP DRAWINGS, PRODUCTS DATA, AND SAMPLES

A. General:

1. Review and submit to the Designer and where outlined below to the DCAMM Project Manager, shop drawings, project data and samples required by Specifications Sections in hard and electronic copies.
2. No submissions made by FAX will be accepted.
3. The General Contractor, within the time frame stated in Section 013200 – CONSTRUCTION PROGRESS DOCUMENTATION after the Pre-Construction Meeting, shall prepare and submit for the Designer and the DCAMM Project Manager's approval, a Schedule of Shop Drawings, Product Data and Samples required to be submitted for the Work. The schedule shall indicate, by Subcontractor, the date by which final approval of each item must be obtained, and shall be revised as required by conditions of the Work, subject to the DCAMM Project Manager's approval. The Schedule of Shop Drawings, Product Data and Samples shall correspond with the construction schedule so that the submissions relate to the time when the products and/or systems will be required on the site. Neither the Designer nor the DCAMM Project Manager will approve a schedule that calls for out-of-sequence submittals.

B. Shop Drawings:

1. Original drawings shall be prepared by General Contractor, Subcontractor, Supplier or Distributor, which illustrate some portion of the Work, showing fabrication, layout, setting, or erection of details.
   a. Shop drawings shall be prepared by a qualified detailer.
   b. Details shall be identified by reference to sheet and detail numbers indicated on Contract Drawings.

c. Maximum sheet size shall be 30-inch by 42-inch.
d. Submit with the required number of opaque prints specified and electronic media herein.

C. Product Data:

1. Manufacturers' catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data. Provide manufacturer's catalogue sheet, specification for each product and other pertinent data as required under the individual specification.
   a. Modify product data submittals to delete information which is not applicable to the project.
   b. Supplement standard information to provide additional information applicable to the project.
   c. Clearly mark each copy to identify pertinent materials, products, or models.
   d. Show dimensions and clearances required.
   e. Show performance characteristics and capacities.
   f. Show wiring diagrams and controls.
2. All such data shall be specific and identification of material or equipment submitted shall be clearly made in ink. Data of general nature will not be accepted.
3. Product Data shall be accompanied by transmittal notice. The General Contractor's stamp of approval shall appear on the printed information itself.
4. Submit the information listed above in both hard and electronic format.

D. Samples:

1. Physical samples shall illustrate materials, equipment, or workmanship, and shall establish standards by which work is judged. After review and approval, samples may be used in construction of project if not retained for comparison
   a. Office samples of sufficient size and quantity shall clearly illustrate:
      1) Functional characteristics of product or material, with integrally related parts and attachment devices.
      2) Full range of color samples (including standard and premium ranges).
      3) After review and approval by Designer and the DCAMM Project Manager, samples may be used in construction of project if not retained for comparison.
   b. Field Samples and Mock-ups
      1) Erect at project site at locations acceptable to the Designer and the DCAMM Project Manager.
      2) Construct each sample of mock-up complete, including work of all Subcontractors required in finished work. Samples shall be incorporated into a larger mock-up with varied products and Subcontractors if required.
2. Unless otherwise specified in the individual Section, the General Contractor shall submit two labeled specimens of each Sample.
3. Samples shall be of adequate size to permit proper evaluation of material. Where variations in color or in other characteristics are to be expected, samples shall show the maximum range of variation. Materials exceeding the variation of the approved samples will not be approved on the Work.

4. Samples which can be conveniently mailed shall be sent directly to the Designer, accompanied by transmittal notice. On the transmittal notice the General Contractor shall stamp his approval of Samples submitted.
5. All other Samples shall be delivered at the field office of the DCAMM Resident Engineer with Sample identification tag attached and properly filled in. Transmittal notice of Samples so delivered with the General Contractor's stamp of approval, shall be mailed concurrently to the Designer and the DCAMM Project Manager to confirm their receipt thereof.
6. If Sample is rejected by the Designer, a new Sample shall be resubmitted in the manner specified herein above. This procedure shall be repeated until the Sample is approved in writing by the Designer.
7. Samples will not be returned unless return is requested at the time of submission. The right is reserved to require submission of Samples whether or not specified in the Specifications, at no additional cost to the Commonwealth.

E. Mock-ups: Erect at project site at location acceptable to Designer and the DCAMM Project Manager, a mock-up complete, including work of all Subcontractors required in finished work.

1.4 GENERAL CONTRACTOR'S RESPONSIBILITIES:

A. Review shop drawings, Product Data and Samples prior to submission. Verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications.
5. Integration with adjoining work.
6. Delivery schedule.
7. Is the product an equal to the product specified or a substitution? If either of these occur a comparison sheet must be submitted comparing the proposed product to the product specified.

B. All shop drawings prepared by Subcontractors shall be processed through the General Contractor. The General Contractor shall check all the shop drawings for conformity with the Contract Documents and particularly for field measurements and proper fit with adjoining work prior to submitting same to the Designer for approval. Certification shall appear on each shop drawing stating that the General Contractor has made his/her check. Format and content of the General Contractor’s certification stamp shall be subject to approval by the DCAMM Project Manager and the Designer and shall include, but not be limited to:

1. The Term "By Others" shall not be used on shop drawings, the General Contractor shall state by whom related items are to be furnished and/or installed.
2. The Designer reserves the right to reject and return to the General Contractor, without examination, any shop drawings which have not been previously checked and certified as outlined above, which carry the term "by other" or such vague reference, which are difficult to read, which have arrived by FAX or which in any way are obviously not in conformity with Contract Requirements.

3. Shop drawings shall show materials, design, dimensions, connections and other details necessary to ensure that they accurately interpret the Contract Documents and shall also show adjoining work in such detail as required to provide proper connection with same.
4. The Designer will check and approve shop drawings only for conformance with the design concept and for compliance with information given in the Contract Documents. Approval of shop drawings by the Designer will not release the General Contractor from his responsibility for furnishing same of proper dimensions, size quantity and quality to effectively perform the work and carry out the requirements and intent of Contract Documents.
5. Such approval will not relieve the General Contractor from responsibility for errors of any sort in the shop drawings, nor for the proper coordination of any submittal with all other work. If the shop drawings deviate, or are intended to deviate, from the Contract Documents, the General Contractor shall so advise the Designer in writing at the time the shop drawings are submitted, stating the difference in value between the Contract requirements and that denoted by said shop drawings.
6. The General Contractor shall assume full liability for delay attributed to insufficient time for delivery and/or installation of material or performance of the work when approval of pertinent shop drawing is withheld due to the failure of the General Contractor to submit, revise, or resubmit shop drawings in adequate time to allow the Designer and the DCAMM Project Manager a reasonable time, not to exceed twenty-one (21) calendar days, for normal checking and processing of each submission or resubmission.

C. Coordinate each submittal with requirements of Contract Documents.

D. The General Contractor's responsibility for errors and omissions in submittals is not relieved by the Designer’s review and approval of submittals, unless Designer gives tentative written acceptance of specific deviations identified as such by the General Contractor, subject to written concurrence by the DCAMM Project Manager.

E. Notify the Designer in writing at the time of submission, of deviations in submittals from requirements of Contract Documents or previous submissions.

F. Work that requires submittals shall not commence unless submitted with Designer’s stamp and initials or signature indicating review and approval, and DCAMM Project Manager’s initials or signature of concurrence indicate review and approval.

1. No work shall be started in the shop or on the job, or materials delivered to the site, until pertinent shop drawings have been approved by the Designer and the DCAMM Project Manager.

G. After aforesaid review and approval, distribute copies.

H. Maintain one (2) copies of each approved submittal at the project site. One for the General Contractor and one for the DCAMM resident.

1.5 SUBMISSION REQUIREMENTS:

A. General: All submittals shall be made to the Designer’s Office. The quantity and make-up of submittals shall be as established by the Designer; however, two (2) additional copies of all

submittals shall be transmitted to the DCAMM Project Manager at the same time that such submittals are transmitted to the Designer. The Designer will log and distribute submittals for review by his consultant engineers. The General Contractor shall distribute all Civil, Structural, and MEP shop drawings directly to the Designer. All submittals shall be in both hard and electronic copies.

B. Make submittals promptly in accordance with approved schedules, and in such sequence as to cause no delay in the work.

C. Submit number of samples specified in each Section of the Specifications.

D. Submittals shall include:

1. Date and revision dates.
2. Project title and number.
3. The names of:
   a. Designer;
   b. General Contractor;
   c. Subcontractor;
   d. Supplier;
   e. Manufacturer;
   f. Separate detailer when pertinent.
4. Identification of product or material.
5. Location of work and relation to adjacent structure or materials.
6. Field dimensions clearly identified as such.
7. Specification Section number and specific paragraph under which item is specified.
8. Submission number.
9. Applicable standards, such as ASTM number.
10. A blank space, five-inch by four-inch, for the Designer’s stamp.
11. General Contractor’s remarks. Identify exceptions or deviations from Contract Documents and reasons for them.
    a. If shop drawings submitted by the General Contractor indicate a departure from the Contract and the Designer deems it to be minor adjustment in the interest of DCAMM (subject to concurrence by the General Contractor stating it does not involve a change in Contract Price or extension of time), the Designer may approve the submission, but the approval shall be subject to DCAMM review and acceptance of the Designer’s recommendation.
    b. The approval of DCAMM shall be inferred to contain in substance the following: The change is so ordered with the understanding that it does not involve any change in the Contract Price or Time, and that it is subject generally to all contract stipulations and covenants, and is without prejudice to any and all rights of DCAMM under the Contract.
12. General Contractor's stamp, initialed or signed certifying review and approval of submittal.
13. Any other items as called for by the Designer, the DCAMM Project Manager or required by the manufacturers.
14. The Designer reserves the right to ask for shop drawings for any or all items on the project, whether or not requested in individual specification sections, at no additional cost to the Commonwealth.

1.6 RESUBMISSION REQUIREMENTS:

A. Resubmission: Resubmission procedure shall follow the same procedures as the initial submittal with the following exceptions:

B. Shop Drawings:

1. Transmittal shall contain the same information as the first transmittal except that the submission number shall change sequentially. The drawing number/description shall be identical as the first transmittal but the date shall be the revised date for that submission.
2. No new material should be included on the same transmittal for the resubmission.
3. Indicate on drawings any changes which may have been made other than those requested by the Designer.

C. Product Data and Samples:

1. Submit any new data and samples as required from previous submittal.

1.7 THE DCAMM PROJECT MANAGER'S AND DESIGNER'S REVIEWS AND DISTRIBUTION OF SUBMISSIONS

A. The DCAMM Project Manager and/or his/her designees will review submittals concurrently with the Designer and his/her consultant engineers. The Designer and the DCAMM Project Manager shall communicate within the aforesaid review period time frame (21 calendar days). The time frame for the Designer's review will not exceed fourteen (14) calendar days between her/his receipt of submittal and contacting the DCAMM Project Manager. After the Designer's (and his/her consultant engineers) review, distribution shall be as stated herein.

1. If submittal is 'reviewed - no exceptions taken', or 'reviewed, make corrections noted', the DCAMM Project Manager shall compose a transmittal indicating the status. The DCAMM Project Manager will then return one (1) copy of the submittal together with the transmittal to the Designer, and shall retain one (1) copy for her/his records. The Designer shall copy and attach the DCAMM Project Manager's transmittal to each submittal, stamp the submittals in concurrence with the status agreed to, and transmit back to the General Contractor, with one (1) copy sent directly to the DCAMM Resident Engineer. The General Contractor shall then distribute said submittals to appropriate Subcontractors, and one (1) copy to the DCAMM Resident Engineer.
2. If submittal is 'reviewed - revise and resubmit' or 'rejected', the DCAMM Project Manager shall compose a transmittal indicating the status. The DCAMM Project Manager will then return one (1) copy of the submittal together with the transmittal to the Designer, and shall retain one (1) copy for her/his records. The Designer shall copy and attach the DCAMM Project Manager's transmittal to each submittal, stamp the submittals in concurrence with the status agreed to, and transmit back to the General Contractor for resubmission. A copy of the transmittal, indicating that a submittal was disapproved and returned to the General Contractor, will be forwarded from the Designer to the DCAMM Project Manager with an additional copy forwarded from the Designer to the DCAMM Resident Engineer, for their records.
3. If a submittal is 'reviewed - no exceptions taken' or reviewed, make corrections noted' by the Designer, or approved as noted by the Designer, but the DCAMM Project

Manager does not concur, a meeting between the Designer and the DCAMM Project Manager will immediately be established to resolve the impasse within the overall review period time frame (21 calendar days). The DCAMM Project Manager will have final authority as to the disposition of the submission. The Designer's position of approval (or disapproval) must be based on the contractual criteria of design intent, function, structure, and durability. The DCAMM Project Manager's contrary position must also be based on these criteria.

4. The combined review period, for the Designer and the DCAMM Project Manager, will not exceed twenty-one (21) calendar days from the established date of each submission indicated on the Schedule of Shop Drawings, Product Data and Samples, plus the additional time, if any, for distribution by the General Contractor and receipt of submissions by the Designer and DCAMM Project Manager. The General Contractor is required to anticipate review time, including time for possible rejection and resubmission, in establishing Schedule dates.
    a. The aforementioned time provided the Designer for checking shop drawings is from the date of receipt of shop drawings by the Designer to the mailing date of shop drawings returned to the General Contractor by the Designer.
5. The Designer will process the submission and indicate the appropriate action on the submission and the transmittal. Incomplete or erroneous transmittals will be returned without action.
6. The Designer will fill out transmittal in the following sequence:
    a. Date received from General Contractor.
    b. Date forwarded to DCAMM Project Manager.
    c. Date received from DCAMM Project Manager.
    d. Date returned to General Contractor.
    e. Action taken on submission.
    f. Distribution, including number of copies distributed and type of material distributed (i.e., print, brochure or sample, etc.).
    g. Designer's remarks (note major deviations from the Contract Documents).

B. Designer's Review Procedure:

1. Stamped REVIEWED, "NO EXCEPTIONS TAKEN":
    a. No corrections or resubmissions required, fabrication may proceed.
2. Stamped REVIEWED, "MAKE CORRECTIONS NOTED":
    a. If General Contractor complies with noted corrections, fabrication may proceed. Submit corrected print for final review.
    b. If, for any reason, the General Contractor cannot comply with the noted corrections, fabrication shall not proceed and General Contractor shall resubmit, following procedures outlined in this Section.
3. Stamped REVIEWED, "REVISE AND RESUBMIT" OR "REJECTED":
    a. General Contractor shall revise and resubmit for review. Fabrication shall not proceed.

C. Manufacturer's Instruction

1. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing, in quantities specified for product data., with two (2) additional copies submitted to the DCAMM Project Manager and one (1) copy to the DCAMM Resident Engineer.

D. Certificates of Compliance: Submit certificates of compliance with the associated Shop Drawings, Product Data, and Samples required for the product in quantities specified for certificates of compliance, with two (2) additional copies submitted to the DCAMM Project Manager and one (1) copy to the DCAMM Resident Engineer.

E. Field Samples: Provide field samples of finishes at the project as required by individual Specification Section. Install sample complete and finished.

F. Patterns and Colors: Submit accurate color charts and pattern charts to the Designer for review and selection whenever a choice of color or pattern is available in a specified product, unless the exact color and pattern of a product are indicated in the Contract Documents. Color and Pattern charts shall represent the manufacturer's complete standard offerings, except where Specifications limit the offerings by defining a particular series or product type which is normally limited in color and pattern availability. Color and Pattern charts shall be submitted in quantities specified with two (2) additional copies submitted to the DCAMM Project Manager and one (1) copy to the DCAMM Resident Engineer.

1.8 SCHEDULE OF VALUES

A. Prior to the first request for payment, the General Contractor shall submit to the Designer and the DCAMM Project Manager, a Schedule of Values of the various portions of the Work in sufficient detail to reflect various major components of each Subcontractor, including quantities when requested, aggregating the total contract sum, and divided so as to facilitate payments for work under each Section. The schedule shall be prepared in such form as specified or as the Designer or the DCAMM Project Manager may approve, and it shall include data to substantiate its accuracy. Each item in the Schedule of Values shall include its proper share of overhead and profit. This schedule, including breakdown and values, requires the approval of the Designer and the DCAMM Project Manager and shall be used only as a basis for the General Contractor's request for payment

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013543

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 – GENERAL REQUIREMENTS that are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. Furnishing all labor, materials, and equipment and perform all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operation under this Contract. For the purpose of this Section, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of runoff, dust, noise, and solid waste, as well as other pollutants. Work shall include installing, maintaining, and removing sedimentation and erosion control components within the Limits of Work.

C. This Section does not address erosion and sedimentation control requirements which are addressed in Section 312500 - EROSION AND SEDIMENTATION CONTROLS and the Stormwater Pollution Prevention Plan (SWPPP Plan) in the Appendices.

1.3 SECTION INCLUDES

A. Applicable Regulations

B. Notifications

C. Protection of Groundwater

D. Protection of Streams And Wetlands

E. Protection of Land Resources

F. Protection of Air Quality

G. Maintenance of Pollution Control Facilities During Construction

H. Noise Control

I. Diesel Equipment Emission Controls

J. Spill And Discharge Control

1.4 RELATED SECTIONS

A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS:

1.5 APPLICABLE REGULATIONS

A. The General Contractor shall comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

B. Fines and related costs resulting from failure to provide adequate protection against any environmentally objectionable acts and corrective action to be taken are the obligations of the General Contractor.

1.6 NOTIFICATIONS

A. DCAMM may notify the General Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements may notify the General Contractor in writing, through DCAMM, of any non-compliance with State or local requirements. After receipt of such notice from DCAMM or from the regulatory agency through DCAMM, the General Contractor shall immediately take corrective action. Such notice, when delivered to the General Contractor or his/her authorized representative at the site of the Work, shall be deemed sufficient for the purpose. If the General Contractor fails or refuses to comply promptly, DCAMM may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the General Contractor unless it is later determined that the General Contractor was in compliance.

PART 2 - PRODUCTS

2.1 WATER

A. Water used for dust control and equipment washes shall be clean and free of salt, oil, and other injurious materials. The General Contractor shall provide all necessary water.

2.2 ONSITE SPILL KIT

A. The General Contractor shall provide the following minimum equipment to be kept onsite at all times during site work activities for any unexpected spills or discharges:

1. Sand, clean fill and absorbent pillows,
2. Four drums (55 gallon, U.S. DOT 17-E or 17-H),
3. Shovels, and
4. Steam cleaner for decontamination of tools and equipment.

PART 3 - EXECUTION

3.1 PROTECTION OF GROUNDWATER

A. Care shall be taken to prevent, or reduce to a minimum, any discharges to the ground of liquids that may infiltrate to the underlying groundwater or enter on-site waterways. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the groundwater or waterway shall not be discharged from the Site. Such waters shall be collected and disposed of by the General Contractor in accordance with all applicable Federal, State and local regulations.

3.2 PROTECTION OF STREAMS AND WETLANDS

A. Care shall be taken to prevent, or reduce to a minimum, any damage to any wetland from pollution by debris, sediment, or other material. Manipulation of equipment and/or materials in delineated wetland areas is prohibited. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in downstream waters of the State, shall not be discharged from the Site. Such waters shall be collected and disposed of by the General Contractor in accordance with all applicable Federal, State and local regulations.

3.3 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of remediation activities that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to Limits of Work areas shown on the Drawing.

B. Outside of the Limits of Work as shown on the Drawing, do not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. Snow fence or other approved equal shall be erected at the “fall line” of the tree canopy, and no vehicles or storage will be permitted within, to prevent damage to trees.

C. The locations of storage and other facilities, required in the performance of the Work, shall not be within wetlands or resource areas.

3.4 PROTECTION OF AIR QUALITY

A. Burning – The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control – Maintain all demolition excavations, stockpiles, waste areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded (MADEP 310 CMR 7.09.-7.10) and which would cause a hazard or nuisance to others.

C. The General Contractor shall provide adequate means for the purpose of preventing dust and odor caused by construction operations throughout the period of the construction contract. If DCAMM or the Designer indicates that the level of dust or odors is unacceptable, the General Contractor shall employ measures necessary to reduce dust or odors to an acceptable level.

D. The General Contractor shall implement engineering controls (e.g. watering, misting) to control dust whenever required by the Designer or DCAMM.

3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution, erosion, and sedimentation control as long as the operations creating the particular pollutant area being carried out.

3.6 NOISE CONTROL

A. The General Contractor shall develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum. Local noise ordinances shall govern.

B. The General Contractor shall execute construction work by methods and by use of equipment which will reduce excess noise.

C. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with Federal and State regulations.

D. The General Contractor shall manage vehicular traffic and scheduling to reduce noise.

3.7 DIESEL EQUIPMENT EMISSION CONTROLS

A. All motor vehicles and construction equipment shall comply with all pertinent local, state, and federal regulations covering exhaust emission controls and safety.

B. All General Contractor and Subcontractor diesel-powered non-road construction equipment with engine horsepower (HP) ratings of 50HP and above, which are used on the Project Site for a period in excess of 30 calendar days over the course of the construction period on the Project Site, shall be retrofitted with Emission Control Devices in order to reduce diesel emissions.

C. The reduction of emissions of volatile organic compounds (VOCs); carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment shall be accomplished by installing Retrofit Emission Control Devices.

D. Acceptable Retrofit Emission Control Devices for the Project shall consist of oxidation catalysts or other comparable technologies that are (1) included on the US Environmental Protection Agency (EPA) *Verified Retrofit Technology List* and/or the California Air Resources Board *Currently Verified Technologies List*; and (2) are verified by EPA or CARB, to provide a minimum emissions reduction of 50 percent for VOCs, 40 percent for CO and 20 percent for PM. Attainment of the required reduction in PM emissions can also be accomplished by using less polluting Clean Fuels. Verified technologies can be identified on the following websites:

EPA: http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm

CARB: http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies/cvt.htm

E. The emission control equipment can be procured through the Statewide Contract #VEH71 that has fixed costs associated with retrofitting of diesel emission control devices. The following are the vendors listed on the State-wide Contract:

1) Cummins Northeast, Inc.
Contact: Scot Lengel
Telephone Number: 781-329-1750
E-Mail Address: Scot.L.Lengel@cummins.com

2) Patriot International Trucks, LLC/Anderson International Trucks of Boston
Contact: John Anderson, Jr.
Telephone Number: 800-277-4777
E-Mail Address: john@andersonmotors.com

3) Clean Diesel Technologies, Inc.
Contact: Glen Reid
Telephone Number: 203-327-7050
E-Mail Address: greid@cdti.com

F. Construction shall not proceed until the General Contractor has submitted a certified list of the non-road diesel-powered construction equipment subject to this specification which either are or will be retrofitted with emission control devices. The list shall include (1) the equipment number, type, make, and General Contractor/Subcontractor name; and the emission control device make, model, and EPA verification number. General Contractors shall also submit a receipt or other documentation from a manufacturer or installer that verifies that appropriate equipment has been installed. The General Contractor shall also identify any vehicles that will use Clean Fuels. Equipment that has been retrofitted with an emission control device shall be stenciled or otherwise clearly marked as "Low Emission Equipment".

G. The General Contractor shall submit monthly reports, updating the same information stated in Paragraph F above, including the quantity of Clean Fuel utilized. The addition or deletion of non-road diesel equipment shall be indicated in the report.

H. The General Contractor shall use methods to control nuisance odors associated with diesel emissions from construction equipment including but not limited to the following: (1) turning off diesel combustion engines on construction equipment not in active use and on trucks that are idling for five minutes or more; and (2) locating diesel equipment away from the general public and sensitive receptors.

I. All costs associated with implementation of the diesel equipment emissions control shall be borne by the respective General Contractor or Subcontractor and included in their cost for performing the work of the Contract.

3.8 SPILL AND DISCHARGE CONTROL

A. The General Contractor shall provide equipment and personnel to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. The collected spill material shall be properly disposed of at the General Contractor's expense.

B. Costs to provide the above spill and discharge control materials shall be included in the contract base bid price.

END OF SECTION

SECTION 014000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 REQUIREMENTS INCLUDED

A. General Contractor's Quality Assurance.

B. General Contractor's Testing Responsibilities.

C. DCAMM's independent agencies.

D. Duties of the General Contractor's testing agencies.

E. Welding.

F. Field engineering.

G. Examination of substrate.

H. General Contractor's Quality Assurance and Quality Control Plan.

1.3 RELATED SECTIONS

A. Section 013100 – PROJECT MANAGEMENT AND COORDINATION:

1. General project management and coordination.

B. Section 014325 – TESTING AGENCY SERVICES:

1. Testing to be performed by the Owner's Independent Testing Laboratory, exclusive of testing to be performed by the General Contractor.

1.4 GENERAL CONTRACTOR'S QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing services agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended

Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

B. Each independent inspection and testing agency engaged on the project shall be authorized by authorities having jurisdiction to operate in the Commonwealth of Massachusetts.

1.5 GENERAL CONTRACTOR'S TESTING RESPONSIBILITIES

A. The General Contractor shall provide inspections, tests and quality control services specified in individual specification Sections and required by governing authorities, except where they are specifically indicated to be solely the responsibility of a Subcontractor in the respective specification section or solely the responsibility of DCAMM.

B. Engage and pay for the services of an independent agency acceptable to the DCAMM Project Manager to perform the specified inspections, testing, and quality control. Submit qualifications to the DCAMM Project Manager. General Contractor's testing agency/laboratory shall be licensed by the Commonwealth of Massachusetts Department of Public Safety.

C. Re-testing: The General Contractor is responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Documents requirements, regardless of whether the original test or service was the General Contractor's responsibility.

D. Substitutions, Suspicious Issues and Designer Initiated Testing: The General Contractor is responsible for inspections, tests and similar services for substitutions, suspicious issues identified by the General Contractor or DCAMM Project Manager, and testing initiated by the Designer.

E. Associated Services: The General Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as required. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

1. Provide access to the work and furnish incidental labor and facilities necessary to facilitate inspections and tests.
2. Take adequate quantities or representative samples of materials that require testing or assist the agency in taking samples.
3. Provide facilities for storage and curing of test samples and delivery of samples to testing laboratories.
4. Provide the agency with a preliminary design mix proposed for use for material mixes that require control by the testing agency.
5. Provide security and protection of samples and test equipment at the project site.

F. The General Contractor shall prepare and submit to the DCAMM Project Manager for approval a Quality Assurance and Quality Control Plan within 30 days from Notice to Proceed. A Quality Assurance and Quality Control (QA/QC) Plan shall promote completion of all work in accordance with the Contract Documents including Contract, Construction Drawings, Specifications, Project Procedures, Approved Submittals and Shop Drawings, Approved

Changes, Applicable Codes and Regulations, Referenced Industry Standards, and similar items. The primary purpose of this quality plan is to ensure that all in place work by the General Contractor and all Subcontractors is performed correctly the first time and is turned over and represented as complete and defect free in accordance with the Contract Documents.

G. If required by the Contract, the General Contractor shall assign a dedicated Quality Assurance and Quality Control Manager for the duration of the project. If the Contract does not require a dedicated Quality Assurance and Quality Control Manager, the General Contractor shall prepare and submit to the DCAMM Project Manager their QA/QC Plan as discussed in Par. E above. In addition, if this Contract does not require a dedicated QA/AC Manager, the duties of the QA/AC Manager as delineated in Par. 1.5F6 shall be carried out by another qualified member of the General Contractor's onsite staff.

1. The purpose of a QA/QC Manager shall be to prepare and submit the Quality Assurance and Quality Control Plan for approval and to be responsible for and to manage adherence to the plan throughout the construction process. The QA/QC Manager shall be designated for the project from the initial notice to proceed through system acceptances by both the designer and DCAMM Project Manager. The QA/QC Manager shall at all times instill an expectation that all work will be completed correctly and in an expeditious manner and shall be responsible for enforcement of the General Contractor's Staff and all Subcontractors to this plan.
2. Have extensive experience in building construction, project controls, and previous QA/QC training and practical knowledge.
3. Have excellent communication and writing skills, be highly organized and be able to work with both management and Subcontractors.
4. Have a working knowledge of project scheduling.
5. The General Contractor shall submit substantiating documentation attesting to the proposed QA/QC Manager's capabilities to the DCAMM Project Manager and the Designer for approval.
6. Duties of the QA/QC Manager:
    a. Prepare and submit QA/QC Plan for approval.
    b. Conduct and submit minutes for all requisite Quality Meetings.
    c. Coordinate and report on all daily quality activities.
    d. Verify accurate documentation by Subcontractors and Vendors.
    e. Work with DCAMM Commissioning Agent.
    f. Oversee final project records pertaining to quality.
    g. Report, photograph and distribute evidence of deficient and/or defective construction conditions or materials that cannot be corrected within three work days of observation. When such conditions or materials are remedied report, photograph and distribute evidence of remedial work prior to concealing. Photographs shall be dated and defects and/or deficiencies shall be clearly labeled on the photographs.

1.6 DCAMM'S INDEPENDENT TESTING AGENCIES

A. DCAMM will engage an independent testing agency at its own expense to perform certain tests and similar services as set forth in Section 014325. Information provided by DCAMM's Independent Testing Agency shall be for the sole use of DCAMM's Project Manager, and shall not relieve the General Contractor of its responsibilities to provide its own quality control, to

meet all requirements of the Contract and to provide a completed project free from construction defects.

B. It is the General Contractor’s responsibility to provide and pay for its own inspection and testing to assure quality control. General Contractor shall be responsible for coordinating its work with requirements of DCAMM's testing agencies, and shall provide reasonable services in support of facilitating work of DCAMM's testing agencies as required.

1.7 DUTIES OF THE GENERAL CONTRACTOR’S TESTING AGENCIES

A. The General Contractor’s independent testing agency engaged to perform inspections, sampling and testing of materials and construction shall cooperate with the Designer and General Contractor in performing its duties, and shall provide qualified personnel to perform required inspections and tests.

B. The testing agency shall notify the Designer and General Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.

C. The testing agency shall not perform any duties of the General Contractor.

D. The General Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.8 GENERAL CONTRACTOR’S QUALITY CONTROL REQUIREMENTS, GENERAL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of the quality as specified.

B. Comply fully with manufacturer's instructions, including each step in sequence.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortions, or disfigurement. Anchorage devices shall be labeled to allow for visual inspection and verification of type of anchorage device.

1.9 WELDING

A. Certified Welders:

1. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required. Operators shall be certified welders; certification

must be shown to the Resident Engineer and must be current. Provide a copy of certification(s) to the DCAMM Resident Engineer.

2. Pipe welds shall be made by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Designer before any work is performed. Welders' certification card must be shown to the Resident Engineer. . Provide a copy of certification(s) to the DCAMM Resident Engineer.
3. Shop welding shall be in accordance with the "Code for Welding in Building Construction."
4. Welders shall provide their own portable generating equipment for electric welding. Use of the Commonwealth's electrical system for welding will not be permitted.

B. Welding and Cutting:

1. Where electric or gas welding or cutting work is done above or within ten (10) feet of combustible material or above a space that may be occupied by persons, use interposed shields of incombustible material to protect against fire damage or injury due to sparks and hot metal.
2. Place tanks supplying gases for gas welding or cutting at no greater distance from the work than is necessary for safety, securely fastened and maintained in an upright position in accordance with applicable codes. Store such tanks in a locked enclosure remote from any combustible material and free from exposure to the rays of the sun or high temperatures.
3. Maintain suitable fire extinguishing equipment near all welding and cutting operations. When operations cease for the noon hour or at the end of the day, thoroughly wet down the surroundings adjacent to welding and cutting operations.
4. Station a workman equipped with suitable fire extinguishing equipment near welding and cutting operations to see that sparks do not lodge in floor cracks or pass through floor or wall openings or lodge in any combustible material. Keep the workman at the source of work which offers special hazards for thirty (30) minutes after the job is completed to make sure that smoldering fires have not been started.
5. Place a qualified electrician in charge of installing and maintaining electric and arc welding equipment. Remove damaged electric, arc or gas welding equipment from the site.

1.10 MANUFACTURER'S REPRESENTATIVES

A. If required by specific Specification Sections, manufacturer's representative shall be present at the job site for supervision of work during installation of materials. Such representative shall be present during all aspects of construction to ensure proper installation of all applicable items. Refer to other sections of these specifications for additional requirements.

1.11 FIELD ENGINEERING

A. Survey work through the course of all phases of construction shall conform to the following guidelines:

1. General Contractor shall employ a competent Civil Engineer or Land Surveyor, registered in the Commonwealth of Massachusetts, who will establish permanent benchmarks. Maintain all established bounds and benchmarks and replace as directed any which are destroyed or disturbed.
2. Prior to the installation of permanent construction (foundations, slab-on-grade, utilities, etc.) General Contractor shall provide a certification signed by Engineer/Surveyor warranting the principal lines, levels, and overall dimensions are accurately established in accordance with the Contract Documents.
3. Establish all lines and grades for the work, and verify all locations, property lines, work lines and other dimensioned points indicated on the Drawings for the project site.
4. Submit to the Designer a written confirmation of locations of all lines, and any discrepancies between conditions and locations as they actually exist and those indicated on the Drawings. General Contractor shall not commence any excavation or construction work until verification has been received and approved by the Designer. Upon receipt of approval from the Designer, provide one (1) copy of that approval to the DCAMM Resident Engineer.
5. General Contractor shall be held responsible for any damage incurred thereby to DCAMM, due to incorrect laying out of the work. In the event that errors or discrepancies are discovered on the Drawings, the General Contractor shall immediately notify the Designer and no further work shall be performed until the discrepancy has been corrected by the Designer.

1.12 EXAMINATION OF SUBSTRATE

A. Installers of materials, products or equipment shall:

1. Examine base surfaces upon which materials, products or equipment are to be installed.
2. Examine conditions upon which materials, products or equipment are to be installed.
3. Where there is any question as to the dryness of a surface, test with a modern moisture-indicating machine.
4. Notify the General Contractor, in writing, with a copy to the Designer, if conditions are detrimental to proper and timely construction and completion of the work.

B. Do not proceed with work until unsatisfactory substrate, or not acceptable conditions have been corrected. Commencement of installation constitutes acceptance of substrate or base surfaces, and the cost of any corrective work due shall be borne by the installer applying his/her materials, products or equipment thereon.

1.13 GENERAL CONTRACTOR'S QUALITY ASSURANCE AND QUALITY CONTROL PLAN

A. The General Contractor's Quality Assurance and Quality Control Plan shall instill an expectation that all work will be completed correctly and in an expeditious manner. In all instances the General Contractor shall be responsible for the adherence to and enforcement of the General Contractor's Staff and all Subcontractors to this plan.

1. Submit the General Contractor's Quality Assurance and Quality Control Plan to the DCAMM Project Manager within 30 days from the Notice to Proceed. Submit in format acceptable to DCAMM's Project Manager. Identify personnel, procedures, controls,

instructions, tests, records, and forms to be used to carry out General Contractor's quality-assurance and quality-control responsibilities. Coordinate with General Contractor's construction schedule.

B. The Plan shall include specific procedures for conducting formalized inspections of predetermined selected work items at the time the General Contractor first starts new work. These inspections are performed by a designated QA/QC Inspection Team composed of authorized representatives from DCAMM, the General Contractor, A/E, Subcontractor(s) (whose work is being inspected) and others as may be required.

C. The Quality Assurance and Quality Control Plan shall be created as a General Contractor Project Specific Quality Plan addressing at a minimum the following components:

1. Quality meetings.
   a. Pre-construction conference.
   b. Pre-installation review meetings.
   c. Coordination meetings.
2. Regular Daily Inspections.
3. Building Exterior Envelope Review.
4. First Delivery of Material / Equipment Inspections.
5. First Equipment in Place Inspections.
6. Mock-up Inspections.
7. Bench Mark Inspections.
8. Follow-Up Bench Mark Inspections.
9. Below Grade / In-Wall and Above Ceiling Inspections.
10. Utility Activation and Start-Up Inspection Procedures for Equipment/Systems Prior to Validation.

D. Quality Meetings:

1. Pre-construction Conference:
   a. A conference held to discuss all aspects of the construction project such as the schedule, payment procedures, change order procedures and much more. This meeting is held immediately after contract award.
   b. The DCAMM Project Manager, Designer, Design Consultants, General Contractor and Subcontractors will attend these meetings.
2. Pre-Installation Review Meetings:
   a. A review meeting shall be held for certain kinds of work requiring special coordination efforts between Subcontractors, a better understanding of how the work is to be performed by one or more Subcontractors, sequencing of work between the Subcontractors, or a review of special requirements pertaining to the work to be performed. This type of meeting is conducted just prior to starting the actual work. The meeting is scheduled and run by the General Contractor on an as needed basis.
   b. The DCAMM Project Manager, Designer, General Contractor and all applicable Subcontractors will attend these meetings.
   c. The General Contractor’s Staff and Subcontractor’s actual supervisory people who will be performing the work in the field are to attend these meetings.
   d. Safety precautions relating to the work to be performed are also to be discussed as part of this meeting.

3. Coordination Meetings:
   a. The General Contractor shall conduct project Coordination Meetings at regular intervals. Project Coordination Meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings. An example would be regularly scheduled MEP coordination meetings to monitor the progress of the MEP coordination process.
   b. General Contractor shall request representation by every party currently involved in coordination or planning for the construction activities involved.
   c. General Contractor shall record meeting results and distribute copies to everyone in attendance and others affected by decisions or actions resulting from each meeting. The DCAMM Project Manager and the Designer are to be on the Distribution List.

E. Regular Daily Inspections:

1. The General Contractor will monitor the quality of the in-place construction work daily, to ensure that it complies with the requirements of the Contract Documents, Pre-Construction Meetings, Pre-Installation Meetings and Coordination Meetings.
2. The General Contractor shall log, record and distribute daily record of quality monitoring as a component of daily reporting and provide notification on a regular basis during construction of currently observed items requiring corrective action
3. The QA/QC Inspection Team will inspect work periodically based on observations noted in General Contractor's reporting to verify completion and compliance.

F. Building Exterior Envelope Review:

1. DCAMM will engage and pay for an independent testing firm to perform a review of the exterior envelope building design.
2. The design review will be performed by an independent consulting firm experienced with this type of work.
3. The scope of services for the building exterior envelope review shall include a documented review of the exterior building envelope design details and specifications, review of proposed product and material submittals prior to material acquisition, and on-site quality control inspections as deemed appropriate by the General Contractor and DCAMM Project Manager.
4. Physical inspections shall include on-site meetings with project personnel, including the DCAMM Project Manager, Designer, General Contractor and Subcontractors at various stages of installation.
5. The scope of the building envelope inspection, or review, should include, but is not limited to exterior building materials, flashings, bracing, anchors, weep holes and other water removal systems from with-in cavity walls, roofing systems, caulking and other sealants, parapet wall cap details, mullion details at openings, waterproofing below grade, and other abutting materials or systems.
6. The General Contractor will coordinate with and support the exterior envelope review inspections to include coordination of first delivery inspections, mock-ups and benchmarks called for within envelope system or specific materials specifications to which the design review of this section may apply.

G. First Delivery of Material/Equipment Inspection:

1. The General Contractor shall manage and keep current an anticipated delivery schedule for all materials and equipment to be delivered to the site and provide regular updates or upon request to the DCAMM Project Manager and QA/QC Inspection Team.
2. The General Contractor shall log, record and distribute any account on the first delivery of each type of material or equipment as a component of daily reporting and provide notification on a regular basis during construction of currently observed items requiring corrective action
3. First deliveries will be verified against the requirements of the design documents and the approved submittals. Nonconforming materials and/or equipment will not be allowed to be set into place and will be removed from the site.
4. This inspection establishes the basis for judging all future deliveries of like material/equipment.

H. First Equipment In Place Inspection:

1. The General Contractor shall manage and keep current an anticipated schedule for all materials and equipment to be inspected in place and provide regular updates or upon request to the DCAMM Project Manager and QA/QC Inspection Team.
2. General Contractor and QA/QC Inspection Team will inspect and document the first setting of equipment to verify it is in conformance with the requirements of the Contract Documents.
3. The installation and assembly will be verified against the requirements of the design documents and the approved shop drawings.
4. The General Contractor shall log, record and distribute any account for each type of first in place equipment inspection as a component of daily reporting and provide notification on a regular basis during construction of currently observed items requiring corrective action or pending inspection.
5. Upon acceptance of the equipment in place, the General Contractor can proceed with permanently anchoring it into place by the means prescribed in the Contract Documents.
6. This inspection establishes the basis for judging all future setting of like equipment.

I. Mock-Up Inspections:

1. The General Contractor will note all Mock-Ups required by the Contract Documents and include the activity in their construction schedule and submit for review and approval of the DCAMM Project Manager, the Designer and the QA/QC Inspection Team.
2. The General Contractor shall log, record and distribute any account of Mock-Up(s) as a component of daily reporting and provide notification on a regular basis during construction of currently observed items in process, requiring corrective action, or follow up, and inspection.
3. General Contractor will benchmark each work type within the Mock-Up for conformance with the requirements and review with the QA/QC Inspection Team.
4. The QA/QC Inspection Team shall review, comment that the work appears in conformance to the requirements. Comments are documented and distributed by the General Contractor. Non-conforming work will be corrected at no additional cost to DCAMM.
5. The approved Mock-Up establishes a basis for judgment for all later like construction.
6. The Mock-Up process and inspection(s) does not take away from the responsibility of the General Contractor and installing contractors to provide a finished and fully functioning product and to maintain the construction schedule.

J. Benchmark Inspections (In Sequence Work):

1. The General Contractor in consultation with the DCAMM Project Manager, Designer and QA/QC Inspection Team will establish which work will be scheduled for benchmarking during the normal course of construction.
2. The General Contractor shall log, record and distribute any account of Benchmark(s) as a component of daily reporting and provide notification on a regular basis during construction of currently observed items in process, requiring corrective action, or follow up, and that require inspection.
3. General Contractor shall note that the work to be inspected has been started and if found to be acceptable shall call for a benchmark inspection to be conducted by the QA/QC Inspection Team.
4. The QA/QC Inspection Team shall review, comment that the work appears in conformance to the requirements. Comments are documented and distributed by the General Contractor. Non-conforming work will be corrected at no additional cost to DCAMM.
5. This inspection establishes the basis for judging all future work of a like type, none of which shall commence until the benchmark is approved.
6. The Benchmark process and inspection(s) does not take away from the responsibility of the General Contractor and installing contractors to provide a finished and fully functioning product and to maintain the construction schedule.

K. Follow-Up Benchmark Inspections:

1. The General Contractor shall ensure that all subsequent work being built of the same type of work that was previously benchmarked will be built in conformance to the Benchmarked work without deviation.
2. The General Contractor and QA/QC Inspection Team will randomly inspect subsequent work being built of the same type of work that was previously benchmarked to ensure the work is being built in conformance with the benchmarked work.
3. The General Contractor shall log, record and distribute any account of follow-up benchmark(s) as a component of daily reporting and provide notification on a regular basis during construction of currently observed items in process, requiring corrective action, or follow up, and that require inspection.

L. Below Grade / In Wall and Above Ceiling Inspections:

1. It is the intent of this section to mandate inspection of as much of the work that is to be enclosed before it has been covered over to avoid having to reopen closed spaces to complete or correct work therein.
2. The General Contractor shall verify that all work is complete within the concealed space and is ready to be inspected before it is enclosed.
3. The General Contractor and all Subcontractors who have work installed within the work area shall sign a closure form stating that their work has been completed and has been inspected by all applicable code officials. General Contractor will be responsible for all costs to have the space reopened later to complete or correct any work within the space, and to have the space closed again, including all costs incurred for any schedule impacts due to this work.
4. Photographs of areas to be permanently enclosed will be taken by General Contractor and retained as a part of the project record.

5. The General Contractor shall log, record and distribute account of below grade, in wall or above ceiling inspections as a component of daily reporting and provide notification on a regular basis during construction of currently observed items in process, requiring corrective action, or follow up.
6. No closure or covering of work shall proceed until all requirements are met and approval given by the QA/QC Inspection Team where such inspections are to be conducted.

M. Utility Activation and Start-Up Inspection Procedures for Equipment/Systems Prior to Validation. Refer also to Section 018100 - COMMISSIONING for additional requirements.

1. Activation Inspection:
   a. The Activation Inspection is required when the General Contractor has verified that system work meets the contract document requirements and has completed the static installation of equipment/systems, and is ready to place it into dynamic operation for the purposes of shakedown, debugging, check-out and similar activities.
   b. The General Contractor shall log, record and distribute any account of pending activations as a component of daily reporting and provide separate individual notification at a minimum of 48 hour notice prior to the scheduled time for placing specific equipment into dynamic operation.
   c. The General Contractor will notify the QA/QC Inspection Team who will inspect the work, the surroundings and provide comment that the installation is safe and appears meets the requirements for operation.
   d. Any deficiencies noted shall be corrected immediately
   e. The General Contractor will then place the equipment/systems into operation for his use, shakedown, debugging, check-out, and similar activities.
2. Start-Up Inspection:
   a. The General Contractor will coordinate with DCAMM's Commissioning Agent to ensure that start-up procedures, O&M's, prefunctional checklists and testing, equipment manufacturer's representation are completed and/or in place according to the approved Commissioning Plan.
   b. The General Contractor shall log, record and distribute any account of pending startups as a component of daily reporting and provide separate individual notification at a minimum of 48 hour notice prior to the scheduled time for placing specific equipment into final operation.
   c. The General Contractor shall coordinate with the QA/QC Inspection Team and DCAMM CA to ensure that the installation operates as required.
   d. All non-conforming work will be corrected immediately.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014200

REFERENCES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract including, but not limited to, the following:

1. DCAMM.
2. The Designer (the Architect-of-Record or Engineer-of-Record as applicable).
3. The DCAMM Project Manager.
4. The DCAMM Resident Engineer.
5. The User Agency.
6. The General Contractor.

B. "Reviewed": When used to convey Designer's action on General Contractor's submittals, applications, and requests, "reviewed" is limited to Designer's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Designer. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities subject to DCAMM and User Agency approval. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source, and have available on site for reference.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

AA	Aluminum Association, Inc. (The)
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABAA	Air Barrier Association of America
ACI	ACI International (American Concrete Institute)
AGC	Associated General Contractors of America (The)
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
APA	APA - The Engineered Wood Association
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (The American Society of Mechanical Engineers International)

ASTM	ASTM International (American Society for Testing and Materials International)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
CDA	Copper Development Association
CISCA	Ceilings & Interior Systems Construction Association
CRI	Carpet & Rug Institute (The)
CSI	Construction Specifications Institute (The)
DHI	Door and Hardware Institute
EPA	Environmental Protection Agency (United States)
FM	Factory Mutual
FMRC	Factory Mutual Research (Now FM Global)
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GS	Green Seal
HPVA	Hardwood Plywood & Veneer Association
ICRI	International Concrete Repair Institute, Inc.
IESNA	Illuminating Engineering Society of North America
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA
LEED	Leadership in Energy & Environmental Design (USGBC)
MFMA	Maple Flooring Manufacturers Association, Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCMA	National Concrete Masonry Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NSF	NSF International (National Sanitation Foundation International)
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NWWDA	National Wood Window and Door Association (Now WDMA)
SDI	Steel Deck Institute
SDI	Steel Door Institute
SGCC	Safety Glazing Certification Council
SJI	Steel Joist Institute

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
TCA	Tile Council of America, Inc.
UL	Underwriters Laboratories Inc.
USGBC	U.S. Green Building Council
WCLIB	West Coast Lumber Inspection Bureau
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WWPA	Western Wood Products Association

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of current edition of Codes in the Commonwealth of Massachusetts.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014325

TESTING AGENCY SERVICES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. DCAMM will engage an independent testing agency at its own expense to perform certain testing, to confirm compliance with contract requirements and criteria described in the various Specification Sections and as the DCAMM Project Manager deems appropriate. It is the General Contractor's responsibility to provide and pay for its own inspection and testing. See Section 014000.

B. Refer also the list of testing below, and to individual Specification Sections for the types and frequency of testing to be performed by DCAMM's independent testing laboratory.

1.3 RELATED SECTIONS

A. GENERAL CONDITIONS

1. Inspections and testing required by laws, ordinances, rules, regulations, or orders of public authorities.

B. Section 014000 – QUALITY REQUIREMENTS

1. General Contractor's responsibility for testing services to maintain quality control.

1.4 DCAMM TESTING AGENCY SERVICES

A. DCAMM testing agency services may include, but not be limited to, the following:

1. Soils; in-place and fill.
2. Piles/Piers.
3. Paving.
4. Loam and seed.
5. Concrete.
6. Waterproofing.
7. Masonry and mortar.

8. Steel.
9. Fireproofing.
10. Firestopping.
11. Roofing.
12. Hangers and supports in Divisions 21-26.
13. Others as required to demonstrate compliance with Contract requirements.

B. Each independent inspection and testing agency engaged on the project shall be authorized by authorities having jurisdiction to operate in the Commonwealth of Massachusetts.

1.5 ENGAGEMENT OF INDEPENDENT TESTING LABORATORY

A. DCAMM will engage and pay for the services of independent inspectors and an independent testing laboratory to perform the services specified under various Sections of the Specifications.

B. The services of a testing laboratory as specified in this Section is intended for the DCAMM Project Manager's verification of the General Contractor’s compliance with the requirements of the Contract Documents. This shall in no way relieve the General Contractor of its responsibilities to provide its own quality control, to meet all requirements of the Contract and to provide a completed project free from construction defects.

C. Services and quantities of testing as specified herein are approximate and may vary. Actual services and quantities of testing will be determined by the DCAMM Project Manager and the Designer during the construction period.

D. Locations for taking sample specimens for testing shall be as directed by the DCAMM Project Manager and the Designer-of-Record.

1.6 GENERAL CONTRACTOR’S RESPONSIBILITIES

A. Cooperate with laboratory personnel and provide access to the work and to fabricator’s facilities as required for the performance of their testing.

B. Provide Casual Labor and Facilities:

1. To provide access to the work to be inspected or tested.
2. To obtain and handle specimens at the site.
3. To facilitate inspections and tests.
4. To construct a storage box, on the site, of sufficient size to store cylinders which will afford protection required by ASTM C31.

C. Shop Drawings: Provide a complete set of construction documents and shop and/or erection drawings for the items being inspected and tested.

D. Samples:

1. Provide the laboratory with preliminary representative samples of materials to be tested, in requested quantities.

2. When the source, quality, or characteristic of an approved source changes or indicates lack of compliance with contract requirements, submit additional samples of materials to testing laboratory.

E. Miscellaneous Reports, Lists: When requested by the Designer or testing laboratory, the General Contractor shall immediately provide copies of mill reports, cutting lists, shipping bills, material bills, time and place of shipment of materials to shop and field, and any relevant data on pressure testing and investigations of materials.

F. Notification:

1. To facilitate the timely sequence of inspection and testing, the General Contractor shall give advanced notification to the testing laboratory and the Designer that work has progressed to the point where inspection and testing may proceed.
2. Advanced notification shall be 48 business hours (minimum) prior to commencement of activity requiring testing and inspection.

1.7 GENERAL CONTRACTOR'S QUALITY CONTROL

A. Services of testing laboratory retained by DCAMM is for verification of General Contractor's compliance and, if such tests or inspection indicates failure to comply with these Contract Documents, the General Contractor shall bear all costs associated with additional testing and inspection after the work has been corrected, to verify compliance.

B. Provide a Quality Control Program, to the DCAMM Project Manager and the Designer for their approval that includes monitoring and enforcement of the quality programs of all Subcontractors. See Section 014000 Quality Requirements.

1.8 PATCHING

A. Areas where samples are taken for purposes of testing shall be patched by the General Contractor to the satisfaction of the DCAMM Project Manager and the Designer-of-Record.

1.9 REPORTING OF RESULTS

A. The testing laboratory shall document the values obtained in all tests, and shall indicate degree of compliance with the requirements of the Contract Documents. Test reports shall include the following information:

1. Designer's project name and number.
2. Type and location of test sample and time and date obtained.
3. Type of test, ASTM or other appropriate designation.
4. Result of test and degree of compliance with Contract Documents.

B. Testing laboratory shall, on a weekly basis, distribute results of all tests as follows:

1. DCAMM – 1 copy

2. Designer – 1 copy
3. Consulting Engineers (as designated by the Designer) – 1 copy
4. General Contractor – 1 copy
5. Subcontractor – 1 copy

C. Notify all parties immediately in the event that test results indicate that strengths, required by the Contract Documents, will not be attained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000

TEMPORARY FACILITES AND CONTROLS

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 REQUIREMENTS INCLUDED

A. Temporary Facilities and Controls including the following:
1. Temporary Water.
2. Weather Protection.
3. Heating During Construction.
4. Temporary Power.
5. Hoisting Equipment and Machinery.
6. Staging.
7. Maintenance of Access.
8. Dust Control.
9. Noise Control.
10. Indoor Air Quality (IAQ) Management.
11. Enclosures.
12. Cleaning During Construction.
13. Field Offices.
14. Telephone Service.
15. Sanitary Facilities.
16. Construction Barriers.
17. Parking.
18. Debris Control and Removal.
19. Safety Protection.
20. Vehicle and Equipment Protection.
21. Shoring.
22. Construction Fence.
23. Project Identification Sign.

1.3 TEMPORARY WATER

A. Water will be furnished by the General Contractor up to the point indicated on the Drawings for the permanent connection to the water supply system.

B. Water shall be distributed by means of connections to the permanent service lines that are to be installed at the expense of the General Contractor.

C. Any temporary hoses and pipe lines and connections from the permanent service lines either outside or within the building, necessary for the use of the General Contractor and his Subcontractors shall be installed, protected, and maintained at the expense of the Plumbing Subcontractor.

D. Temporary hoses and temporary pipe lines used for transporting water shall not be run unattended or unprotected across parking areas, parking area entrance, walkways, plazas, or steps. Temporary hoses and temporary pipelines shall not be permitted to be installed along, through or across corridor and occupied rooms or spaces.

E. The General Contractor shall provide an adequate supply of drinking water from approved sources of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

F. Use of the water may be discontinued by the Commonwealth if, in the opinion of the DCAMM Project Manager, it is wastefully used.

1.4 WEATHER PROTECTION

A. It is the intent of these Specifications to require that the General Contractor shall provide temporary enclosures and heat to permit construction work to be carried on during the months of November through March in compliance with M.G.L. Chapter 149, Section 44D(G). Under no circumstances shall the General Contractor suspend any work during the months of November through March because of their reluctance to provide and pay for temporary weather protection. These Specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible to protect in the judgment of the Designer. Included in the preceding category, without limitation, are such items as site work, excavation, steel erection, erection of certain "exterior" wall panels, roofing, and similar operations.

B. "WEATHER PROTECTION" shall mean the temporary protection of that work adversely affected by moisture, wind, and cold, by covering, enclosing and/or heating. This protection shall provide adequate working areas during the months of November through March as determined by the Designer and consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations. The General Contractor shall furnish and install all "weather protection" material and be responsible for all costs, including heating required to maintain a minimum temperature of 50 degrees F. at the working surface. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the Contract Articles with added regard to performance obligations of the General Contractor.

C. Within 30 calendar days after his award of contract, the General Contractor shall submit in writing to the Designer for approval, three copies of his proposed methods for "Weather Protection."

D. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

E. The General Contractor shall furnish and install one accurate Fahrenheit thermometer at each work area as designated by the Designer. However, one additional accurate Fahrenheit thermometer shall be provided for every 2,000 square feet of floor space where the work areas exceed 2,000 square feet.

1.5 TEMPORARY POWER

A. The utility company will provide electrical energy required for temporary light and power. The Electrical Subcontractor is required under Section 260001 - ELECTRICAL WORK, to provide temporary feeders of sufficient capacity from the local utility company, or from the institution power lines, at the point designated on the drawings, to provide for the electric light and power requirements of the Project while under construction and until the permanent feeders have been installed and are in operation. it is not the intent of the above statement to relieve the General Contractor of the responsibility of payment for energy consumed during construction, but rather to afford him use of permanent feeder, etc. for electric distribution during construction. Payment for energy consumed during construction shall be the responsibility of the General Contractor until either Use and Occupancy or Final Acceptance has occurred.

B. The General Contractor shall pay for the cost of electric energy consumed by himself and by all of his Subcontractors. Any temporary wiring of a special nature, other than that specified in Section 260001 - ELECTRICAL WORK, shall be paid for by the Subcontractor requiring it, such as:

1. Special circuits required by electric welders, elevators, lifts or other special equipment requiring high-amperage and/or special voltage service, etc.
2. Exterior lighting circuits for protection against vandalism, public warning lights, lights for advertising, and similar items.

C. The General Contractor and all Subcontractors, individually, shall furnish all extension cords, sockets, motors, and accessories required for their work. They shall also pay for all temporary wiring of construction offices and buildings used by them. The General Contractor shall pay for the offices of the General Contractor and the Resident Engineer specified in the Contract Form.

D. All temporary wiring installed by the Electrical Subcontractor shall be removed after it has served its purpose. Use copper wire only.

E. All relocations of temporary service to meet construction and/or phasing requirements shall be performed at no additional cost to the Commonwealth.

1.6 HOISTING EQUIPMENT AND MACHINERY

A. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the work shall be furnished, installed, operated and maintained in safe condition by the individual Subcontractors and is so stated in each appropriately related Section of the Specifications. All costs for hoisting operating services shall be borne by the Subcontractors unless specifically excepted in the Contract Documents.
1. A licensed equipment manufacturer’s representative shall be present at all times, to witness the erection and dismantling of all hoisting equipment and machinery, whenever

such equipment is being erected or dismantled. No such work will be performed without the presence of such representative.

2. Hoisting equipment and machinery erection and dismantling shall be performed only by trained, certified, and experienced riggers qualified to perform such work.
3. Copies of such licenses and/or certifications, clearly indicating qualifications, shall be provided to the DCAMM Resident Engineer prior to commencement of such erecting and dismantling work.

B. Review Drawings for hoisting requirements and openness of traffic access routes to installed destinations of specified equipment and furnishings.

1.7 STAGING

A. All staging, planking and scaffolding, exterior and interior, required for the proper execution of the work and over eight feet in height, shall be furnished, installed, and maintained by the General Contractor .

1. Erection and dismantling of staging shall be performed only by trained, certified, and experienced staging personnel qualified to perform such work.
2. Copies of such certifications, clearly indicating qualifications, shall be provided to the DCAMM Resident Engineer prior to commencement of such erecting and dismantling work.

B. All staging up to eight feet in height shall be provided by the individual Subcontractors as applicable to their work.

1.8 MAINTENANCE OF ACCESS

A. The General Contractor shall provide and maintain for the duration of his contract, a means of access to, around and within the site, as indicated on the Contract Drawings, for vehicular traffic and authorized personnel. This means of access shall be construed to sustain the weight of equipment customarily engaged for use in construction projects of this type and magnitude. The General Contractor shall, without additional compensation from the Commonwealth, furnish labor and materials as may be required from time to time to maintain this means of access in an acceptable condition as determined by the Designer. Pedestrian access shall provide adequate protection against falling debris, slippage, adequate lighting, warning and directional signs, and protection against construction activities.

1.9 DUST CONTROL

A. The General Contractor shall have all Subcontractors provide adequate means for the purpose of preventing dust caused by construction operations from creating a hazard, nuisance, and from entering adjacent occupied areas throughout the period of the construction contract.

B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions set forth in the Contract Articles with added regard to performance obligations of the General Contractor.

1.10 NOISE CONTROL

A. Comply with requirements of authorities having jurisdiction. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with silencers, and power equipment with mufflers.
2. Manage vehicular traffic and scheduling to reduce noise.
3. No heavy equipment may be started or idled before 7A.M.

1.11 INDOOR AIR QUALITY (IAQ) MANAGEMENT

A. Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke. At a minimum, take the following measures:

1. Prohibit smoking in the building.
2. Locate exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes, and operable windows.

B. The General Contractor shall develop a Construction Indoor Air Quality Management Plan for this Project and meet requirements of LEED EQ Cr 3.1 and 3.2.

C. During Construction: Comply with the following requirements, per LEED EQ Cr. 3.1:

1. During construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, Chapter 3, November 2007.
2. Protect stored on-site and installed absorptive materials from moisture damage.
3. If the DCAMM Project Manager authorizes the use of permanent heating, cooling, and ventilating systems during construction, install filter media having a Minimum Efficiency Reporting Value (MERV) of 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction. Replace air filters immediately prior to occupancy. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.

D. Before Occupancy: Comply with one of the following requirements, per LEED EQ Cr. 3.2:

1. Option 1 - Flush-Out (Owner-engaged indoor-air-quality testing):
   a. After construction ends, prior to occupancy and with interior finishes installed, perform a building flush-out with new Minimum Efficiency Reporting Value (MERV) 13 filtration media at 100% outside air. After the flush-out, replace the filtration media with new MERV 13 filtration media, except the filters solely processing outside air.
2. Option 2 - Air Quality Testing (General Contractor-engaged indoor-air-quality testing):
   a. Conduct a baseline indoor air quality testing procedure consistent with the United States Environmental Protection Agency's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air."

E. Construction Indoor Air Quality Management Plan Submittal:

1. Within 21 calendar days after receipt of Notice to Proceed, the General Contractor shall submit to the DCAMM Project Manager a finalized Construction IAQ Management Plan.
2. The proposed Plan shall comply with requirements of LEED EQ Cr 3.1 and 3.2.
3. The proposed Plan shall include, but not be limited to, the following:
   a. Protection of ventilation system components during construction.
   b. Cleaning and replacing contaminated ventilation system components after construction, including filtration media.
   c. Temporary ventilation.
   d. Protection of absorptive materials from moisture damage when stored on-site and after installation, including exterior wall rain protection.
   e. Sequence of finish installation plan.
   f. Selection of cleaning products and procedures to be used during construction and final cleaning.
   g. Schedule of emission test data recorded by General Contractor's testing laboratory.

F. Take special care to prevent accumulation of moisture on materials and within packaging during delivery, storage, and handling to prevent development of mold and mildew inside packaging and on products.

G. Immediately remove from site and properly dispose of materials showing signs of mold and mildew, including materials with moisture stains.

H. IAQ Plan Implementation:

1. IAQ Manager: The General Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Construction IAQ Management Plan for the Project.
2. Distribution: The General Contractor shall distribute copies of the Construction IAQ Management Plan to the jobsite foreman, each Subcontractor, DCAMM's Project Manager, and the Designer.
3. Instruction: The General Contractor shall provide on-site instruction of appropriate procedures and methods to be used by all parties at the appropriate stages of the Project.
4. Preconditioning: Allow products, which have odors and significant VOC emissions, to off-gas in a dry, well-ventilated space for sufficient period to dissipate odors and emissions prior to delivery to Project.
5. Remove containers and packaging from materials prior to conditioning to maximize off-gassing of VOCs.
6. Condition products in ventilated warehouse or other building.
7. Coordinate Construction IAQ Management Plan with final cleaning.

1.12 ENCLOSURES

A. Provide temporary, insulated, weather tight closures of openings in exterior surfaces for providing acceptable working conditions and protection for materials, allowing for heating during construction, and preventing entry of unauthorized persons. Provide doors with self-closing hardware and locks.

B. All utilities including electric ducts, conduits, telephone lines, sprinklers, and other utilities shall be protected against damage from construction activity. The General Contractor shall be

responsible for all damage to the utilities from construction and shall repair all such damage at no additional cost to DCAMM.

1.13 CLEANING DURING CONSTRUCTION

A. Unless otherwise specified under the various Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.

1. Refer to Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for additional requirements.

B. Control accumulation of waste materials and rubbish; periodically dispose of off-site in a legal manner. The General Contractor shall bear all costs, including fees resulting from such disposal.

C. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finish operations.

D. Maintain project in accordance with all local, Commonwealth of Massachusetts, and Federal Regulatory Requirements.

E. Store volatile wastes in covered metal containers, and remove from premises.

F. Prevent accumulation of wastes which create hazardous conditions.

G. Provide adequate ventilation during use of volatile or noxious substances.

H. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Identify potential sources of cleaning water runoff and propose abatement procedures.

I. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

J. Use only those cleaning materials and methods recommended by manufacturer of surface materials to be cleaned.

K. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.

L. Provide on-site containers for collection of waste materials, debris, and rubbish.

M. Remove waste materials, debris and rubbish form the site periodically and dispose of at legal disposal dump site (DEP approved).

N. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

O. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.14 FIELD OFFICES

A. The General Contractor shall provide and maintain temporary field offices. The General Contractor's field office and the DCAMM field office shall be adjacent to each other. Provide an uncovered connection point, via a raised platform, to connect at least one entry/egress door of the General Contractor Field Office and the DCAMM Field Office.

B. The General Contractor shall provide a suitable field office on site for its own use. The location shall be at the discretion of the DCAMM Project Manager and the User Agency.

C. Provide a separate conference room space with conference table and chairs to accommodate twenty (20) persons at one time.

D. In addition, the General Contractor shall provide an office in a separate trailer of not less than 1,600 square feet on the site for the DCAMM Project Manager. Provide the office with partitions to separate it from public access, electric light, heat, air conditioning, window blinds and window screens. Office shall provide four private office areas, a men's and a women's toilet facility. Provide two entry/egress doors to the exterior with code compliant access to grade. Provide an insulated floor and surround the trailer with a continuous skirt. The location shall be at the discretion of DCAMM and the User Agency.

1. Provide to the DCAMM Project Manager for his/her approval the proposed layout of the construction trailer's public areas, private office areas and bathroom.
2. The DCAMM temporary office shall be fully functional, with all utilities and equipment in place, within fifteen (15) working days before the date that the General Contractor intends to begin any on-site activities.
3. The General Contractor shall provide and maintain a portable generator of sufficient capacity, if necessary, until a more permanent and reliable source of temporary power is established.
4. The General Contractor shall provide a code compliant means of providing the Office with reliable services for portable water supply and sewage disposal. Provide systems that are unaffected by weather.
5. The General Contractor shall hire a cleaning company to provide weekly cleaning of the DCAMM Office Trailer. The weekly cleaning shall include washing of floors, dusting of all surfaces and equipment in all public, all private office areas and both toilet facilities (including sanitizing of all toilet and sink fixtures).

E. Equip the DCAMM Project Manager's office with the following:

1. Five (5) lockable steel desks.

2. Five (5) swivel chairs with padded loop arms and pneumatic seat-height adjustment that raises and lowers chair
3. Two (2) metal plan racks.
4. Four (4) conference tables, each not less than 3 feet x 8 feet.
5. Twenty (20) cloth covered folding chairs.
6. One (1) drafting table, one (1) stool, and one (1) adjustable lamp.
7. Two (2) confetti-cut paper shredders.
8. One (1) accurate Fahrenheit thermometer.
9. Refer to paragraph TELEPHONE SERVICE herein for required phone equipment.
10. Four (4) four drawer metal file cabinets with locks.
11. Four (4) Five shelf open steel book cases (72"H x 34 1/2"W x 13"D)
12. Sample shelving: minimum 24 feet of 10" deep shelf.
13. One (1) electric water cooler with disposable cups and water supply service (monthly).
14. One (1) electric coffee maker with supply service (coffee, sugar, cream, cups, stirrers, etc. – monthly).
15. One hard hat for each DCAMM Resident Engineer and have available, within the DCAMM office Trailer, at all times at least ten (10) visitor hard hats (re-supply as necessary).
16. One (1) dry plain paper color copy machine equal to features of a Xerox 7242 with optional scan features including the optional network scan to Xerox PC Desktop Business Edition (5 seat license Pro version), optional two tray input module, optional 802.1b/g connectivity, and optional language support of Adobe Postscript 3.
    a. Initially supply twelve (12) toner/ink cartridges. The General Contractor shall provide additional printer toner/ink cartridges, as needed by the DCAMM Project Manager throughout the duration of the Project.
    b. Copier shall be accessible via an intranet network to all three Basic Workstations for printing and receiving scans.
    c. At the convenience of the DCAMM Project Manager, provide his/her staff with one full day of instruction.
    d. Provide maintenance service to provide for full restoration of usability within two (2) working days of any reported malfunction. If the color copy machine is found to be unrepairable, then within two working days immediately replace with new.
    e. Provide to the satisfaction of an Authority Having Jurisdiction supplemental heat and cooling that may be necessary to satisfy the copy machine’s operating environment requirements
17. Three (3) electronic calculators with paper printout, including ten paper refills, and five (5) electronic scientific calculators.
18. Three (3) desktop staplers with 25-sheet capacity. Provide 25,000 staples of chisel point staples.
19. One (1) Swingline LightTouch Heavy-Duty Stapler for 120 sheet capacity. Provide 25,000 Swingline LightTouch heavy duty staples.
20. Thirty-six (36) yellow highlighters.
21. Thirty-six (36) mechanical pencils. Provide a total of 120 refill leads.
22. Thirty-six (36) blue point pens.
23. Ten (10) each of White White-out correction fluid and Green White-out correction fluid.
24. Five (5) stainless steel office shears.
25. Forty-eight (48) letter size wide ruled writing pads.
26. Two hundred (200) letter size-hanging folders.
27. One (1) microwave oven.
28. One (1) refrigerator with a freezer section, min 7.5 cu.ft. capacity.

29. Four (4) flashlights with four (4) sets of required batteries.
30. One (1) coat rack or closet.
31. Sufficient quantity of electric lights and outlets.
32. Five (5) desk task lamps.
33. Paper: 8 -1/2" x 11", 20 lb. (5,000 sheets – every four months).
34. Paper: 8-1/2" x 14", 20 lb. (5,000 sheets – initially, then supply as needed DCAMM Project Manager.
35. Paper: 11" x 17", 20 lb (5,000 sheets – initially, then supply as needed DCAMM Project Manager.
36. Equipment listed above shall be installed and maintained by the General Contractor until completion of this Contract. ANY PIECE OF EQUIPMENT (excluding the copy machine; refer to Specification Paragraph 1.15.E.16.3) THAT BECOMES INOPERABLE SHALL BE REPLACED WITH NEW WITHIN TEN BUSINESS DAYS. All equipment devices and accessories shall be returned to the General Contractor.

F. Computers: The General Contractor shall be required to furnish (or lease) and install the following additional office equipment for DCAMM's Project Office for the duration of the Project. The General Contractor shall install and render fully functional all computer system equipment and software, as hereinafter defined and shall be responsible to maintain and/or replace all such items as may become lost, inoperative or damaged in the course of normal use. Provide maintenance service to provide for full restoration of usability within two (2) working days of any reported malfunction. If a Basic Workstation Unit is found to be unrepairable within two working days, then immediately replace with new. At the completion of the project, the General Contractor retains ownership of the equipment.

1. Basic Workstation Unit (Three (3) units required) shall include each of the following:
    a. Intel 2.66GHz or higher
    b. System Memory (RAM) 4 GB DDR3 expandable to 12GB, provide 12GB
    c. 640GB Hard Drive—SATA (7200 rpm)
    d. Graphic Card ATI RADEON HD 4850 (minimum 512 MB video memory)
    e. Integrated Built-in 10/100/1000 Ethernet LAN (RJ-45 connector) compatible with operating system.
    f. Integrated Sound Card shall support 7.1-channel
    g. 2.1 Multimedia speaker system with external power. Minimum 20 watts RMS
    h. Internal DVD ± -Read and Rewritable/CD- Read and Rewritable; 16x8x16 DVD+RW; 16x6x16 DVD-RW; 48x4x48 CD-RW
    i. 19-in-1 media card reader that supports SmartMedia, xD-Picture Card, CompactFlash I/II, Microdrive, Secure Digital, Secure Digital High Capacity, miniSD, microSD, MultiMediaCard, MultiMediaCard4 and Reduced-Size MultiMediaCard (RS-MMC). Also supports and Reduced-Size MultiMediaCard4 (RS-MMC4), MultiMediaCard Micro, Memory Stick, Memory Stick PRO, Memory Stick Duo, Memory Stick PRO Duo and Memory Stick Micro
    j. Eight (8) high-speed USB 2.0 ports (4 Front , 4 Rear) 2.0 USB ports
    k. Two (2) FireWire(IEEE1394a)ports (1 front and 1 rear))
    l. One Parallel Port.
    m. One (1) USB cabled Optical mouse with pad.
    n. One (1) Optical Wireless mouse.
    o. One (1) USB 101 key keyboard.

p. One (1) Flat Screen Monitor, 19 inch or greater, 1440x900 resolution color monitor, Ultrafast 5 ms response time, 1000:1 contrast ratio; 300 cd/m² brightness, HD-ready via digital DVI input with HDCP; standard analog WVGA input 16:10 widescreen aspect ratio. Compatible with the Graphic Card. Minimum dot pitch 0.285mm. Meets EPA Energy Star conservation standard (implemented in hardware)
q. Latest Version of Windows Professional System operating software.
r. Latest version of Microsoft Professional Office Suite.
s. Latest version of Adobe Acrobat Professional.
t. Latest version of AntiVirus software (e.g. Norton AntiVirus, including subscription updates for the life of the project)
u. Latest version of Roxio Creator software.
v. Internet service with a connection speed of a minimum reliable 54 Mbps via a cable, DSL, FIOS, or satellite service. Provide for the duration of the project an internet cable or DSL service provider.
w. One (1) flatbed digital laser color copier/printer/scanner with 35-page automatic document feeder (capable of both 8.5 x 11 and 8.5 x 14), parallel and USB 2.0 full speed interfaces compatible with both Windows and Macintosh operating systems. 32MB of internal memory. Black and white printing not less than Up to 30 ppm and color printing not less than 25 ppm. Separate ink cartridges for black and color. Photo quality output, Up to 1200 x 2400 dpi for color and up to Up to 1200-rendered dpi for black. Copier resolution Up to 1200 x 1200 dpi. Multiple copies up to 50. Reduction and enlargement 50% to 400%. Duty cycle up to 1,000 sheets per month. Provide associated software.
    1) Initially supply twelve (12) toner/ink cartridges. The General Contractor shall provide additional printer toner/ink cartridges, as needed by the DCAMM Project Manager throughout the duration of the Project.
x. 200 CD and 200 DVD Recordable, and, 100 CD and 100 DVD Rewritable. Provide 600 jewel cases.
y. Ten (10) USB thumb drive with 4GB capacity.
z. One (1) Surge Protector of 10 total outlets, all with surge protection, 5 with battery backup; includes 2 block-spaced; 750VA rating with 450 watts of power; 365-joule surge energy rating; provides up to 70 minutes of battery backup in case of power failure; high-speed Internet surge protection, fax, DSL, coaxial cable and Ethernet; file-saving, auto shutdown software (Windows XP, USB connectivity) included Resettable circuit breaker; rechargeable, replaceable battery.
aa. For all of the above equipment a Parts, Labor, On-site Warrantee Repair/Replacement for the duration of the project.

2. Provide additional internet connectivity for a minimum of five (5) concurrent users. The minimum reliable connection speed shall be 54Mbps. The intended use of these additional internet connections are to allow internet access by the other project team members using their own computers.

G. Provide the DCAMM Project Manager's office with the latest edition of the following documents:

1. Provide the DCAMM Project Manager with two (2) copies of the edition (upon which the Contract Documents were approved) of the following documents:
    a. Massachusetts Building Code.
    b. Massachusetts Fuel, Gas and Plumbing Code.

c. Massachusetts Electrical Code with National Electrical Code Handbook.
d. Massachusetts Elevator Code.

2. Provide the DCAMM Project Manager with one (1) copy of the latest edition of the following documents:
   a. R. S. Means Estimating Books
      1) Building Construction Cost Data.
      2) Site Work Cost Data.
      3) Concrete Cost Data.
      4) Mechanical Cost Data.
      5) Electrical Cost Data.
   b. NFPA 13, 13A, 14, 14A, 20, 70 and 101 Standards.
   c. SMACNA (Sheet Metal and Air Conditioning National Association): Design Manuals: DCS, DDT, IAQ, LTM, RCDC, RMAC, RNDC and TAB.
   d. Complete set of Contract Documents, including Drawings and Specifications.

H. The General Contractor shall, on a daily basis, maintain all of the offices and conference space to be clean, orderly, heated and air conditioned.

I. Refer to paragraph 1.15.D.3 and paragraph 1.16 for sanitary facilities requirements.

J. One digital camera capable of recording images on an external memory card.

1. Camera shall be capable of minimum 10.0 Megapixels photos with a minimum 3X Optical Zoom.
2. Camera shall also be capable of recording video with sound.
3. Provide four (4) compatible 4-Gigabyte memory cards.
4. Provide two (2) sets of compatible rechargeable lithium ion batteries with battery charger.
5. Any piece of equipment that becomes inoperable shall be replaced with new equipment within 10 business days.

K. One 2 foot long electronic ‘smart level’ with an accuracy of 0.1 degree.

1.15 TELEPHONE SERVICE

A. In addition to its own telephone requirements, the General Contractor shall provide and maintain separate direct line telephone service at the site in compliance with Article 111, paragraph 8 of the Contract Form and the following additional requirements. Any piece of equipment that becomes inoperable shall be replaced with new equipment within 10 business days.

1. Provide at least one (1) coin box telephone for the use of the workmen engaged in the work. The location shall be at the discretion of DCAMM and the User Agency.
2. Provide five (5) dedicated telephone lines for the DCAMM Project Manager and the following equipment:
   a. Four (4) cordless telephones with following features:
      1) Keypad in both base and remote units.
      2) Last number redial.
      3) Minimum ten (10) number memory.

4) Speakerphone in the handset unit.
5) DECT 6.0 system with 1.9GHz frequency.
6) Telephone paging units.
7) Replacement batteries as needed.

b. One (1) FAX machine with minimum 20-page auto document feeder and a minimum 200 sheet capacity.

c. One (1) answering machine (can be integral unit of another cordless telephone defined above) with following features:
1) Variable announcement time, up to 30 minutes.
2) Remote message retrieval.
3) Message memo with time/date stamp.
4) Digital counter.

3. Provide each DCAMM Resident Engineer a cell phone with services of caller ID, call waiting, conferencing, voice mail, a direct connect function compatible with the General Contractor's Superintendent(s) and Field Engineer(s) cell phone, and the related service for the length of the Project. The cell phone service shall include unconditional replacement of a lost or a damaged cell phone.

4. Communications' system maintenance and replacement service to insure operation throughout the Contract period. Minimum next day on-site service required.

5. Equipment listed above shall be installed and maintained by the General Contractor until completion of this Contract. Any piece of equipment that becomes inoperable shall be replaced with new equipment within 10 business days. All equipment devices and accessories shall be returned to the General Contractor.

B. Pay for the installation and removal of the temporary telephones and equipment and for all calls and fixed charges in connection therewith.

1.16 SANITARY FACILITIES

A. The General Contractor shall provide suitable toilet facilities for its staff, the Resident Engineer and the Designer, and additional facilities for the workmen on the job, including personnel of Subcontractors.

B. The Resident Engineer's trailer shall be equipped with toilet room containing a working chemical toilet. If potable water and sanitary sewerage is available, a regular toilet may be installed rather than a chemical toilet. Trailer shall not be removed from site until at least one toilet room in new building is operational.

C. Provide chemical toilets where work is in progress and in quantity required by OSHA Code.

D. Chemical toilets and their maintenance shall meet requirements of state and local health regulations and ordinances and shall be subject to the approval the Resident Engineer and Designer.

E. Upon completion of new toilet facilities, the DCAMM Project Manager may designate a specific toilet area to be used for the General Contractor and Subcontractors engaged in the Work. However, General Contractor shall take responsibility for maintenance and cleaning of such areas and shall leave them in first class condition equal to the accepted conditions of toilet facilities not used for construction personnel.

1.17 CONSTRUCTION BARRIERS

A. Proper construction barriers shall be provided around the contract work areas as defined by the Contract Drawings or as directed by the Resident Engineer.

B. Construction barriers shall consist of traffic cones, ribbons, tapes, secure fencing, trench covers, wood barriers, warning signs, directional signs, and other traffic materials to keep traffic and people from area of construction and maintain ongoing operations.

C. Barriers shall be erected at such approved locations as are necessary, sufficiently cross-braced and supported adequately from floors and ceilings as required.

1.18 PARKING

A. Only during contract working hours and to the extent available, existing parking facilities located at the construction area will be available for use by the General Contractor, Subcontractors and their employees. Such parking areas shall be designated by DCAMM and User Agency. The Commonwealth shall not be responsible for cars, trucks, etc. or their contents and the General Contractor and his Subcontractors and material suppliers will use the designated area with this understanding.

1.19 DEBRIS CONTROL AND REMOVAL

A. Debris shall not be permitted to accumulate or migrate and the work shall at all times be kept satisfactorily clean. Facility trash receptors shall not be used for the disposal of debris. Dumpster shall be provided by the General Contractor for removal of debris for all Subcontractors.

B. Remove debris from the work site on a daily basis and dispose of same at any (private or public) DEP approved dump that the General Contractor may choose providing that the General Contractor shall make all arrangements and obtain all approvals and permits necessary from the owner or officials in charge of such dumps. Proposed dump site shall be submitted to be approved by DCAMM prior to start of demolition. During disposal process, copies of daily receipts from dumpsite shall be submitted on a regular basis.

1.20 SAFETY PROTECTION

A. At no time shall the work be left unattended without proper safety protection and shall not be left unprotected to the weather and accessible to the public. It is the responsibility of the General Contractor to maintain proper safety protection for the public while work is in progress or unattended.

1.21 VEHICLE AND EQUIPMENT PROTECTION

A. All construction activities shall be performed in such a manner so as not to dust, stain or damage any building elements, equipment, vehicles, etc. within general vicinity of the

construction work area. Any damage to these items shall be cleaned and repaired at the expense of the General Contractor.

1. All construction vehicles and equipment on site shall be effectively disabled and secured when not in use.

1.22 SHORING

A. The Subcontractors shall provide all temporary shoring and bracing as required for the proposed work. Comply with all applicable codes and standards.

1.23 CONSTRUCTION FENCE

A. A construction fence shall be provided along the entire perimeter of the contract limit lines, and shall be kept in good repair at all times, and shall be arranged to maintain ongoing operation's access and egress.

B. Construction fences shall be six feet high and of chain link, or approved equal, erected in a substantial manner, straight, plumb and true as approved by the Designer.

C. Gates shall be built into fence at such approved locations as are necessary, well cross-braced and hung on heavy strap hinges with proper post and hook for double gates. Provide heavy hasps and padlocks for each gate. Provide a set of three keys for each lock to DCAMM Project Manager and Resident Engineer to facilitate emergency access.

D. Fencing shall be removed by the General Contractor at no cost to the Commonwealth at such time before final completion as the Designer directs. Restore site to acceptable condition after removing fence.

1.24 PROJECT IDENTIFICATION

A. Request sketch of sign language and graphics from the DCAMM Project Manager in sufficient time that sign can be fabricated and erected at start of construction.

B. The General Contractor shall provide one 6 foot high by 8 foot wide project sign as indicated and specified following, conforming to DCAMM requirements. Sign shall be fabricated from 1-inch thick MDO exterior grade plywood laminated with waterproof glue. Edges of sign shall be banded with 1 inch by 1/2 inch pressure treated pine banding. Contact the DCAMM Project Manager for wording for this specific project.

C. Sign shall be supported by two 4 by 4 inch post supports set in 12 inch diameter concrete footings to a depth of four feet, such that sign bottom is raised 4 feet above grade. Nails, bolts, and connecting hardware shall be galvanized. Provide alternative method of support if required by site conditions and approved by the DCAMM Project Manager.

D. Sign shall be lettered by a professional sign painter, in accordance with the general layouts attached. Lettering shall be gloss vinyl, size, and color as indicated as attached. Surfaces and edges of sign shall receive two coats of exterior primer and two coats of exterior gloss enamel.

E. Submit a shop drawing indicated sign construction and lettering for approval by the DCAMM Project Manager. The official project title and an electronic file of the attached sketches in Autocad drawing format can be provided to the General Contractor by the DCAMM Project Manager upon request.

F. Locate and install the sign at location directed by the DCAMM Project Manager. At the completion of the Project, remove the sign and supports completely and restore surface to original condition.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 REQUIREMENTS INCLUDED

A. Products include material, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

D. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.

E. In the case of an inconsistency between Drawings and the Project Manual, or within either document which is not clarified by addendum, the product of greater quality or greater quantity of work shall be provided in accordance with the Designer’s interpretation.

1.3 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.4 MANUFACTURERS' INSTRUCTIONS

A. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 013300 - SUBMITTAL REQUIREMENTS, distribute copies to persons involved, and maintain one set in field office.

B. Perform work in accordance with details of instructions and specified requirements.

1.5 TRANSPORTATION AND HANDLING

A. Refer to the Contract and General Conditions and Specifications Sections for requirements pertaining to transportation and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' labeled and unopened containers or packaging, dry

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.6 STORAGE AND PROTECTION

A. Refer to the Contract and General Conditions and Specifications Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

F. Protect masonry and stone products from damage and staining.

G. Protect finished materials, including window frames and doors, with protection acceptable to the DCAMM Project Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017418

DEMOLITION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for recycling and disposing of demolition waste.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 013543 - ENVIRONMENTAL PROTECTION PROCEDURES:
   a. Environmental-protection measures during construction.
2. Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
   a. Additional requirements for addressing existing materials in renovation and/or remodeling projects; not applicable to new construction.

1.3 DEFINITIONS

A. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waster or debris.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75 percent by weight of total waste generated by the Work.

B. Salvage/Recycle Requirements: Salvage and recycle as much non-hazardous demolition and construction waste as possible including the following materials:

1. Asphaltic concrete paving.
2. Concrete and concrete reinforcing steel.
3. Brick and concrete masonry units.
4. Coated brick, concrete, and concrete masonry units. Coatings shall include, but not be limited to: paint, stucco applications, plaster, etc..
5. Wood studs, wood joists, plywood, oriented strand board, paneling and trim.
6. Casework and cabinetry.
7. Structural steel, miscellaneous steel and rough hardware.
8. Roofing.
9. Insulation.
10. Doors, door frames and door hardware.
11. Windows, glass, plastic and glazing.
12. Metal studs.
13. Gypsum board.
14. Acoustical tile and panels.
15. Carpet and carpet pad.
16. Demountable partitions.
17. Equipment.
18. Plumbing fixtures, piping, supports, hangers, valves, and sprinklers.
19. Mechanical equipment and refrigerants.
20. Electrical conduit, copper wiring, lighting fixtures, lamps, and ballasts.
21. Electrical devices, switchgear, panelboards and transformers.

C. In the event the General Contractor encounters previously unidentified material that is reasonably believed to be hazardous, asbestos containing, coated with lead-based paint, or oily debris, the General Contractor shall immediately stop work in the affected area and report the condition to the Designer and DCAMM. At no time shall such material be handled or disposed of by the General Contractor. The General Contractor agrees to cooperate with DCAMM and any consultants engaged by DCAMM to perform services with respect to the analysis, detection, removal, containment, treatment, and disposal of such regulated materials.

1.5 SUBMITTALS

A. Waste Management Plan (WMP): Submit three copies of plan within 30 days of date established for the Notice to Proceed, in a format acceptable to the DCAMM Project Manager.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before submitting a request for Substantial Completion, submit three copies of calculated final rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Facility Permitting Information: For disposal and incinerator facilities provide a copy of the facility's current solid waste management facility permit in accordance with 310 CMR 19.000.

E. Facility Permitting Information: For off-site ABC rubble crushing and/or recycling facilities, provide a statement from the facility that references its specific exemption from the solid waste regulations (per 310 CMR 16.05 (3) (e)) or provide a copy of the facility's current solid waste management facility permit in accordance with 310 CMR 19.000.

F. Record Keeping for Recycling and Landfill and/or Incinerator Disposal: Documentation to be submitted by the Contractor shall include the following as a condition of each payment:

1. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, and/or receipts.
2. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, and/or receipts.

G. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

H. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

I. Qualification Data: The Refrigerant Recovery Technician shall be certified by EPA-approved certification program and shall provide a copy of current certification to the Designer prior to starting work.

J. Statement of Refrigerant Recovery: The Refrigerant Recovery Technician responsible for recovering refrigerant shall prepare and sign a document stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations and using equipment that has a current EPA Registration. The document shall include the name and address of technician, date refrigerant was recovered, amount of refrigerant recovered and shipped, and date of receipt of shipment by the reclaimer.

K. LEED Submittals: The Designer shall prepare a Letter in accordance with LEED guidelines, which shall be signed by the General Contractor. The General Contractor shall provide all information required which includes a tabulation of total waste material, quantities diverted, and means by which it is diverted.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: The Refrigerant Recovery Technician will use recycling/recovery equipment that has a current EPA Registration.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction, including but not limited to, Massachusetts solid waste regulations contained in 310 CMR 16.00 and 310 CMR 19.000.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, and waste reduction, handling, transportation and recycling/disposal procedures. Include separate sections in plan for recycling and disposal of demolition waste. Indicate quantities by weight throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and site-clearing waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Program: List each type of waste and whether it will be recycled or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Donated Materials: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt. Include names, addresses, and telephone numbers.
4. Sold Materials: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt. Include names, addresses, and telephone numbers.

D. Handling and Transportation Procedures: Include methods that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location(s) on Project site where materials separation will be located.

E. Waste Management Coordinator: Identify General Contractor employee who will be the Waste Management Coordinator for the project. The Waste Management Coordinator will be responsible for implementing, monitoring, and reporting status of waste management work plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement Waste Management Plan as approved by the Designer. Provide containers, storage, signage, transportation, and other items as required to implement WMP for the entire duration of the Contract.

B. The General Contractor shall conduct a Waste Management Meeting at the Site. The General Contractor shall review methods and procedures related to waste management including, but not limited to, the following:

1. Distribute approved WMP to everyone concerned within three days of approved submittal return.
2. Clearly identify the Waste Management Coordinator and explain the Coordinator's responsibilities.
3. Review WMP with each subcontractor when they first begin work on-site. Review plan procedures and locations established for recycling and disposal.
4. Review and finalize procedures for material separation and verify availability of containers and bins needed to maintain production.
5. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
6. Provide recycling educational literature for all workers, Subcontractors, and suppliers engaged in on-site activities.
7. Provide appropriate recycling signage for containers and workspaces.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, sold, and disposed.
2. Comply with project requirements for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Sale and Donation: Sale activities are not permitted on Project site. Labor for loading donated items acceptable to local trade practices; union labor if applicable

3.3 RECYCLING DEMOLITION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: Available recycling receivers and processors include, but are not limited to, those listed in the Massachusetts Recycling Directory, available from the Massachusetts State Bookstore (617-727-2834) located in the Massachusetts State House, for recycling operations within the Commonwealth of Massachusetts.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical. For waste which cannot be separated at Project site, co-mingle only with waste which is to be separated later at a recycling facility. Contamination of recycling containers with trash or other contaminants will be addressed by the General Contractor and who will be solely responsible for payment of all fines and penalties.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off User Agency's property and transport to recycling receiver or processor.

D. On-site crushing of non-coated asphalt pavement, brick, and concrete (ABC) rubble as described in 310 CMR 16.05, is allowed, provided performed in accordance with 310 CMR 16.05. All coated ABC waste must be transported off-site to an asphalt batching plant or to an ABC crushing or recycling operation that is either conditionally exempt from 310 CMR 16.00 or has been sited and permitted in accordance with 310 CMR 16.00 and 310 CMR 19.000, respectively.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Deposit all debris in designated container to be transported to approved aggregate recycling facility to be crushed and screened for use as satisfactory soil for fill or sub-base.

C. Masonry: Deposit all masonry debris in designated container to be transported to approved aggregate recycling facility to be. crushed and screened for use as satisfactory soil for general fill or satisfactory soil for fill or sub-base. Clean and stack undamaged whole masonry units on wood pallets for reuse.

D. Wood Materials: Sort and stack salvageable members according to size, type, and length. Separate lumber waste and deposit into appropriate container. Separate engineered wood products, panel products, and treated wood materials into designated containers.

E. Metals: Separate metals by material type if practical. Stack salvageable structural steel members according to size, type of member, and length.

F. Asphalt Shingle Roofing: Organic and glass-fiber asphalt shingles and felts shall be disposed of at a facility permitted by Massachusetts Department of Environmental Protection (DEP) to process post-consumer (used) asphalt shingles. Recycle nails, staples acceptable, flashing trim and accessories as metals.

1. Asbestos containing shingles shall be pre-abated and properly disposed of by a Massachusetts licensed asbestos abatement General Contractor, in accordance with all applicable regulations. Asbestos abatement work, including disposal of asbestos contain materials, is not included in the scope of the Work and will be performed by others.

G. Glass: Deposit glass debris into designated containers to be transported to approved glass-recycling facility.

H. Plastics: Deposit plastic containers and debris into designated containers to be transported to approved plastic recycling facility.

I. Gypsum Board: Deposit scraps of gypsum board into designated container protected from weather and transport to appropriate gypsum-recycling facility to be processed into soil amendment.

J. Acoustical Ceiling Panels and Tile: Deposit pulp able mineral fiber panels into designated container protected from weather and prepare for transport, as directed by manufacturer, to appropriate recycling facility to be processed into new acoustic ceiling panels. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

K. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

L. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

M. Plumbing Fixtures: Separate by type and size fixtures suitable for reuse. Deposit all other fixtures into designated containers by material type to be transported to approved recycling facility.

N. Piping: Separate piping materials by material composition. Deposit in designated containers. Separate supports, hangers, valves, sprinklers, and other components by material type and deposit in designated containers for transport to approved recycling facility.

O. Lighting Fixtures: Separate lamps by type and protect from breakage.

P. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

Q. Conduit: Deposit conduit and fittings into designated container.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. For solid waste disposal facilities located in the Commonwealth of Massachusetts, dispose of materials only in facilities which currently comply with applicable state regulations, including requirements of 310 CMR 16.00 {Site Assignment for Solid Waste Facilities} and 310 CMR 19.000 {Solid Waste Management}, and local bylaws.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off the Owner's property and legally dispose of them.

END OF SECTION

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for recycling and disposing of construction waste.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 013543 - ENVIRONMENTAL PROTECTION PROCEDURES:
   a. Environmental-protection measures during construction.
2. Section 017418 - DEMOLITION WASTE MANAGEMENT AND DISPOSAL
   a. Additional requirements for addressing existing materials in renovation and/or remodeling projects; not applicable to new construction.

1.3 DEFINITIONS

A. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waste or debris.

B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, and/or installation of new materials as part of remodeling, renovation, or repair operations. Construction waste includes packaging.

1. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations prior to renovations or remodeling.

C. Disposal: Removal off-site of construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Develop a Waste Management Plan that states as its objective to attain at project completion a recycling rate of 75 percent or more by weight of the total waste generated by the Work.

B. Recycling Requirements:

1. Maximize recycling of non-hazardous construction waste including the following materials:
   a. Site-clearing waste.
   b. Masonry and CMU.
   c. Lumber, wood sheet materials, and wood trim.
   d. Metals.
   e. Roofing.
   f. Insulation.
   g. Glass.
   h. Plastics.
   i. Gypsum board, refer to paragraph below.
   j. Acoustical ceiling panels.
   k. Carpet and pad.
   l. Piping.
   m. Wire and cable.
   n. Electrical conduit.
   o. Packaging: 100 percent of the following uncontaminated packaging materials: Paper, cardboard, boxes, plastic sheet and film, polystyrene packaging, wood crates, plastic pails.
2. Clean Gypsum Board Waste: For new construction and renovation projects involving 20,000 square feet or greater, divert clean (virgin material) gypsum board waste from disposal to recycling and/or reuse outlets.
   a. For new construction and renovation projects involving less than 20,000 square feet, contractors are encouraged to divert clean gypsum board waste from disposal to recycling and/or reuse outlets.
   b. Clean (virgin material) gypsum board is defined as material without any existing attached material, including but not limited to adhesives, mastics, and paints.

1.5 SUBMITTALS

A. Waste Management Plan (WMP): Submit 3 copies of Plan within 30 days of date established for the Notice to Proceed, in a format acceptable to the DCAMM Project Manager.

B. Waste Management Progress Reports: Concurrent with each Application for Payment, submit three copies of report. The following information shall be included:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste recycled, both estimated and actual in tons.
5. Total quantity, of waste recovered (recycled) as a percentage of total waste.

C. Waste Management Calculations: Before submitting a request for Substantial Completion, submit three copies of calculated final rates for recycling and disposal as a percentage of total waste generated by the Work.

D. Facility Permitting Information: For landfill and/or incinerator facilities, provide a copy of the facility's current solid waste management facility permit in accordance with 310 CMR 19.000.

E. Record Keeping for Recycling and Landfill and/or Incinerator Disposal: Documentation to be submitted by the General Contractor shall include the following:

1. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, and/or receipts.
2. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, and/or receipts.

F. Facility Permitting Information: For ABC rubble crushing and/or recycling facilities, provide a statement from the facility that references its specific exemption from the solid waste regulations (per 310 CMR 16.05 (3) (e)) or provide a copy of the facility's current solid waste management facility permit in accordance with 310 CMR 19.000.

G. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

H. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

I. LEED Submittals: The Designer shall prepare a Letter in accordance with LEED guidelines, which shall be signed by the General Contractor. The General Contractor shall provide all information required which includes a tabulation of total waste material, quantities diverted, and means by which it is diverted.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction, including but not limited to, Massachusetts solid waste regulations contained in 310 CMR 16.00 and 310 CMR 19.000.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, and waste reduction, handling, transportation, and recycling/disposal procedures. Include separate sections in plan for

recycling and disposal of construction waste. Indicate quantities by weight throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Program: List each type of waste and whether it will be recycled or disposed in a landfill or incinerator. Include points of waste generation, total quantity by weight of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Donated Materials: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt. Include names, addresses, and telephone numbers.
4. Sold Materials: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt. Include names, addresses, and telephone numbers.

D. Handling and Transportation Procedures: Include methods that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location(s) on Project site where separated materials will be stockpiled.

E. Waste Management Coordinator: Identify General Contractor employee who will be the Waste Management Coordinator for the project. The Waste Management Coordinator will be responsible for implementing, monitoring, and reporting status of waste management activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement Waste Management Plan as approved by the Designer. Provide containers, storage, signage, transportation, and other items as required to implement WMP for the entire duration of the Contract.

B. The General Contractor shall conduct a Waste Management Meeting at the Site. The General Contractor shall review methods and procedures related to waste management including, but not limited to, the following:

1. Distribute approved WMP to everyone concerned within three days of approved submittal return.
2. Clearly identify the Waste Management Coordinator and explain the Coordinator's responsibilities.

3. Review WMP with each subcontractor when they first begin work on-site. Review plan procedures and locations established for recycling and disposal.
4. Review and finalize procedures for material separation and verify availability of containers and bins needed to maintain production.
5. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
6. Provide recycling educational literature for all workers, Subcontractors and suppliers engaged in on-site activities.
7. Provide appropriate recycling signage for containers and workspaces.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walkways, and other adjacent occupied facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be recycled, reused, donated, sold, and disposed.
2. Comply with project requirements for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical. For waste, which cannot be separated at Project site, co-mingle only with waste, which is to be separated later at a recycling facility. The General Contractor will address contamination of recycling containers with trash or other contaminants and who will be solely responsible for payment of all fines and penalties.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off User Agency's property and transport to recycling receiver or processor.

B. On-site crushing of asphalt pavement, brick, and concrete (ABC) rubble as described in 310 CMR 16.05, is not allowed. All ABC waste must be transported off-site to an asphalt batching plant or to an ABC crushing or recycling operation facility that is either conditionally exempt from 310 CMR 16.00 or has been sited and permitted in accordance with 310 CMR 16.00 and 310 CMR 19.000, respectively.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: To the extent feasible, require shippers using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Concrete: Deposit all debris in designated containers to be transported to approved aggregate recycling facility to be crushed and screened for use as satisfactory soil for fill or sub-base.

D. Masonry: Deposit all masonry debris in designated containers to be transported to approved aggregate recycling facility to be crushed and screened for use as satisfactory soil for general fill or satisfactory soil for fill or sub-base. Clean and stack undamaged whole masonry units on wood pallets.

E. Wood Materials:

1. Clean Cut-Offs of Lumber: Deposit into designated clean wood container to be transported to designated recycling facility for use as mulch or bio-fuel.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

F. Metals: Separate metals by material type if practical. Stack salvageable structural steel members according to size, type of member, and length.

G. Asphalt Shingle Roofing: Deposit asphalt shingles in designated containers for off-site reuse. Nails, staples acceptable, flashing trim and accessories shall be recycled as metals.

H. Glass: Deposit glass debris into designated containers to be transported to approved glass-recycling facility.

I. Plastics: Deposit plastic containers and debris into designated containers to be transported to approved plastic recycling facility.

J. Clean Gypsum Board: Deposit scraps of clean gypsum board into designated container protected from weather and transport to an appropriate gypsum board recycling outlet or permitted construction and demolition debris processing facility that will divert clean gypsum board to an appropriate gypsum board recycling outlet.

K. Acoustic Ceiling Panels: Deposit pulp able mineral fiber panels into designated container protected from weather and prepare for transport, as directed by manufacturer, to appropriate recycling facility to be processed into new acoustic ceiling panels. Separate suspension system, trim, and other metals from panels and sort with other metals.

L. Carpet: Deposit carpet into designated container protected from weather and prepare for transport, as directed by manufacturer, to appropriate recycling facility to be processed into new products.

M. General: Recycle paper and beverage containers used by on-site workers.

3.4 DISPOSAL OF WASTE

A. Except for items or materials to be recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. For solid waste disposal facilities located in the Commonwealth of Massachusetts, dispose of materials only in facilities which currently comply with applicable state regulations, including requirements of 310 CMR 16.00 {Site Assignment for Solid Waste Facilities} and 310 CMR 19.000 {Solid Waste Management}, and local bylaws.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700

CONTRACT CLOSEOUT

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 FINAL CLEANING

A. Unless otherwise specified under the various Sections of the Specifications, the General Contractor shall perform final cleaning operations as herein specified prior to final inspection.

B. Maintain project site free from accumulations of waste, debris, and rubbish, caused by operations. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

C. Cleaning shall include all surfaces, interior and exterior in which the General Contractor has had access whether existing or new.

D. Refer to Sections of the Specifications for cleaning of specific products or work.

E. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

F. Use only those cleaning materials and methods that are recommended by the manufacturer of surface material to be cleaned.

G. Employ experienced workmen, or professional cleaners, for final cleaning operations.

H. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

I. Wash and polish mirrors.

J. All new and existing glass and plastic surfaces throughout the building shall be thoroughly cleaned and washed by qualified window cleaners at the expense of the General Contractor just prior to acceptance of the Work.

K. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces as acceptable to the DCAMM Project Manager.

L. Polish glossy surfaces to a clear shine and provide wax where necessary.

M. Ventilating Systems: Clean permanent filters and replace disposable filters if units were operated during construction. Units should not be operated without filters at all. Throw away filters should be used when operating units prior to Substantial Completion. Submit report of ventilation system cleanliness including ductwork to the DCAMM Project Manager.

N. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

O. Leave all architectural metals, hardware, and fixtures in undamaged polished conditions.

P. Leave pipe and duct spaces, plenums, furred spaces and the like clean of debris and decayable materials.

Q. At the end of the project, General Contractor and each Subcontractor shall remove all his tools, equipment, machinery, and surplus materials from the job site. The General Contractor shall remove all waste materials and rubbish from the project at this time. All temporary structures shall be removed and the project shall be left clean.

R. Subsequent to installation of User Agency furniture, telephones, and equipment, and prior to issue of Certificate of Use and Occupancy, provide additional cleaning to remove any soil resulting from installations of such furniture and equipment. Such additional cleaning may include, but not be limited to dusting of horizontal surfaces, vacuuming, and washing of hard or resilient floor surfaces and re-waxing where required.

1.3 GLASS

A. All broken or defective glass not required to be replaced under the provisions of Section 088000 - GLAZING, shall be replaced at the expense of the General Contractor.

1.4 AS-BUILT DRAWINGS

A. As-built Drawings shall consist of all the Contract Drawings. As-built Drawings shall be kept up-to-date. Information from on-going Work shall be recorded on As-built Drawings within 48 hours of Work being performed.

B. The General Contractor and each Subcontractor shall be required to maintain one set of As-built Drawings, as the work relates to their Sections of the Specifications, at the site.

C. The As-built Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The As-built Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.

D. As-built Drawings, as submitted by the General Contractor shall be verified in the field by the Designer or his Consultants. Verification by the Designer shall occur during the construction process and prior to the related work being completed and covered up.

E. The As-built Drawings shall be available at all time for inspection by the DCAMM Project Manager or Designer. All deficiencies noted shall be promptly corrected.

F. The following information shall be indicated on the As-Built Drawings:

1. Record all changes, including change orders, in the location, size, number and type both horizontally and vertically of all elements of the project which deviate from those indicated on all the Contract Drawings.
2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the As-built Drawings shall be plus or minus two (2) inches.
3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.
4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, cleanouts, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps and maintenance devices. The location of these internal utilities, appurtenances, and devices shall be shown by offsets to the column grid lines on the Drawings.
5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the As-built Drawings.

G. At the end of each month and before payment for materials installed, the General Contractor, each Subcontractor, and agents of the Commonwealth shall review As-built Drawings for purpose of payment.

1. If the changes in location of all installed elements are not shown on the As-Built Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

H. Prior to the installation of all finish materials, a review of the As-built Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as determined by the Designer.

I. At the completion of the contract, each Subcontractor shall submit to the General Contractor a complete set of his respective As-built Drawings indicating all changes. After checking the above drawings, the General Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the As-built Drawings to the Designer.

1. As-Built Drawings shall be submitted electronically to the Designer, in a format which can be added to the complete plans as constructed.

J. The Designer shall review the drawings and shall verify by letter to the DCAMM Project Manager that the work is accurate. The Designer shall incorporate all changes on the original drawings; thus creating Record Drawings. The Designer shall submit to the DCAMM Project Manager, electronic files in Autocad 2000 (or later version) format with two (2) sets of prints to be used for the final inspection of the project. Inaccuracies in As-built Drawings, as determined by the Designer and the DCAMM Project Manager, may be grounds for postponement of the final inspection or delay the processing of final payment until such inaccuracies are corrected by the General Contractor.

1.5 OPERATING AND MAINTENANCE REQUIREMENTS

A. At least two weeks prior to the time of turning over this contract to the Operating Agency for Use and Occupancy, or Final Acceptance, the General Contractor shall secure and deliver to the Operating Agency via the Designer, three (3) complete, indexed files and three (3) CD or DVD copies, containing approved operating and maintenance manuals, shop drawings, record of paint colors, floor and ceiling materials and other data as follows.

1. Operating manuals and operating instructions for each model and type of equipment in each of the various systems. Include operating instructions for systems integrating several pieces of equipment.
2. Catalog data sheets for each item of mechanical or electrical or equipment actually installed including performance curves, rating data and parts lists.
3. Catalog sheets, maintenance manuals, and approved shop drawings of all mechanical or electrical equipment controls and fixtures with all details clearly indicated, including size of lamps and other maintenance supplies.
4. Names, addresses and telephone numbers of all Subcontractors and suppliers, together with repair and service companies for each of the major systems installed under this contract.
5. Provide a steel cabinet for storage of manuals and operating instructions.

B. Non-Availability of operating and maintenance manuals or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the DCAMM Project Manager until such time as the discrepancy has been corrected.

1.6 CLOSEOUT REQUIREMENTS AND SUBMITTALS

A. Procedural Requirements Prior to Use and Occupancy: Punch List:

1. During the finishing stages of the project, the General Contractor shall make frequent inspections with Subcontractors, the Designer, and the DCAMM Resident Engineer, so as to progressively check for and correct faulty work.
2. During the course of construction of the project, the General Contractor shall procure and maintain test records and certificates that will be required prior to issuance of the Department of Public Safety (DPS) Certificate of Occupancy and the Division of Capital Asset Management and Maintenance (DCAMM) Certificate of Agency Use and Occupancy.
3. When the General Contractor determines that he/she is Substantially Complete*, he/she shall prepare for submission to the Designer a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the General Contractor to complete all work in accordance with contract Documents. The General Contractor’s list shall be accompanied with certificates that will be required as prerequisites for applying for a DPS inspection
   a. *NOTE: Substantially Complete means that less than one percent (1%) of all contract work, including change orders, remains to be done, and that none of the remaining work will affect health, safety, or function.
4. Upon receipt of the General Contractor’s list of items to be completed or corrected, the Designer will promptly make a thorough inspection, together with representatives of DCAMM and the Operating Agency, and prepare a “punch list”, setting forth in accurate

detail any items on the General Contractor's list and additional items that are not acceptable. Concurrently, the General Contractor will arrange for a DPS inspection.

5. When the punch list has been prepared, and any DPS Inspector comments* have been included, the Designer will arrange a meeting with the General Contractor and Subcontractors, and the DCAMM Project Manager, to identify and explain all punch list items and answer questions on the Work that must be done before Final Acceptance.
   a. If a DPS inspector (including, but not limited to AABA, boiler, elevator or any other authorized inspector) requires modifications and/or additions that were not included in the construction documents, the Designer should review the applicable code(s) and provide written interpretation to the DCAMM Project Manager together with his/her recommendations.
6. The General Contractor shall immediately correct all punch list items that affect health, safety or function (as determined by the Designer, completion of which is required before issuance of a DCAMM Certificate of Agency Use and Occupancy).
7. Upon receipt of the DCAMM Certificate of Agency Use and Occupancy, and its adjunct monetized punch list, the General Contractor shall cause the completion of all of the other punch list items within the timeframe required by said certificate, but not more than 45 calendar days if the timeframe is not indicated on the said certificate.
8. There is a history of specific items that are essential to the Use and Occupancy, but are frequently overlooked. Some things to watch for are:
   a. Provide properly colored and positioned exit signs.
   b. Properly located emergency lighting fixtures.
   c. Complete or, by agreement, schedule personnel training.
   d. Final cleaning.
   e. Ventilating systems:
      1) Clean permanent filters and replace disposable filters if units were operated during construction.
      2) Clean ducts, blowers, and coils if units were operated without filters during construction.
      3) Leave pipe and duct spaces, plenums, furred spaces and the like clean of debris and materials subject to decay.
   f. Provide a properly working lock for the medical environmental closets (if applicable).
   g. Assure that exterior and interior fire rated and egress doors are operating properly and have the proper hardware.
   h. Assure that fire-rating labels are on doors and frames that are supposed to have them.
   i. Assure that smoke barriers are properly installed and located.
   j. Assure that the spare set of each type of sprinkler head and a head removal tool have been provided.
   k. Assure that floors drain properly.
   l. Assure that proper hot water temperatures are provided. Unless otherwise specified or required by a User Agency, the temperature set on building master controllers of hot water shall apply:
      1) HW to toilet rooms and janitors closets shall be 140°F.
      2) HW to individual tubs or showers shall be controlled, in addition to the master controller above, with thermostatic valves set to furnish HW at a temperature not exceeding 110°F and equipped with anti-scald feature.
      3) HW rinse water to dishwashers shall be controlled at 180°F.
   m. Assure that proper water pressure is provided for the sprinkler system.

n. Assure that low-consumption (LC) toilets have been installed (1.6 gpf or less).
o. Re-lamp if permanent lighting system was used during construction.
p. As-built marked-up drawings should be completed and transferred over to the Designer.

B. Prerequisites for Department of Public Safety (DPS) Certificate of Inspection and/or Certificate of Occupancy: Prior to requesting a Department of Public Safety (DPS) inspection, the General Contractor shall provide (via transmittal to the DCAMM Resident Engineer) the following "closeout submittals:"

1. Project record documents and as-built marked-up drawings.
2. Approved operating and maintenance (O & M) data.
3. Extended guarantees and warranties.
   a. General Contractor's General Guarantee shall effectively include:
      1) A written guarantee, for one (1) year from date of Substantial Completion of the project, against defective workmanship, material, installation and equipment for all work of the project. Repair or replacement of defective workmanship, material, installation or equipment that develop within this period shall be accomplished promptly upon notification to the General Contractor, to the satisfaction of the Operating Agency, at no cost.
      2) Replace or repair material or equipment that requires excessive service during the guarantee period.
      3) Guarantee shall include 24-hour service of complete system(s) during guarantee period at no additional cost.
      4) Provide manufacturer's engineering and technical staff at site promptly to analyze and rectify problems that develop during guarantee period. If problems cannot be rectified promptly, to the satisfaction of the User Agency, advise the Designer in writing; describe efforts to rectify situation and provide analysis of cause of problem.
   b. Manufacturer's Guarantee or Warranty
      1) In addition to guarantee requirements above, obtain manufacturers' written installation, equipment, and material warranties for time periods indicated in the various Specification Sections of the Contract Documents. Such manufacturers' warranties contained within the Specification Sections, together with any other warranties offered in manufacturers' published data, are to be transferred to the User Agency.
   c. Keys and keying schedule.
   d. Spare parts and maintenance materials ("attic stock"),
   e. Evidence of compliance with requirements of governing authorities including, without limitations, the following:
      1) Certificate of Inspection, in form of signed permits from the electrical, plumbing, gas, fire department, boiler, and any other required inspectors.
      2) Certification from the local fire department to the effect that all detection, alarm and suppression systems, and other equipment or systems under fire department jurisdiction are approved.
      3) When carpeting and/or draperies are provided, a flame, smoke and fuel-rating certificate provided by the supplying General Contractors.
      4) Elevator certification(s) from the elevator inspector obtained through the General Contractor's Elevator Subcontractor.

5) A letter from the Plumbing Subcontractor. that the potable water supply has been sanitized.
6) Septic system certification obtained from the town by the General Contractor (when applicable).
7) Pressurized vessel certifications from the boiler inspector obtained through the Mechanical Subcontractor.
8) When air balancing is required, the air balancing report prepared by the Mechanical Subcontractor (or commissioning agent, when applicable), and accepted by the design Registered Professional Engineer.
9) When smoke control/fire emergency ventilation system is required, the test report prepared by the Mechanical Subcontractor (or commissioning agent, when applicable), and accepted by the design Registered Professional Engineer.
10) Evidence of test and approval for Department of Environmental Protection (DEP) and Department of Public Health (DPH), when applicable.

C. Prerequisites for Department of Public Safety (DPS) Certificate of Inspection and/or Certificate of Occupancy: Prior to requesting a Department of Public Safety (DPS) inspection, the Designer shall provide (via transmittal to the DCAMM Resident Engineer) the following "closeout submittals:"

1. Certification, from the design Registered Professional Engineer, stating that the fire protection systems have been installed in accordance with the approved fire protection construction documents and meet the requirements of 780 CMR 903.1.
2. Structural Engineer-of-Record (SER) final report as required by 780 CMR 1705.3.
3. Certification, from the design Registered Professional Engineer, stating that the emergency lighting and power systems have been installed in accordance with the approved electrical construction documents.

D. Upon completion of the Work for which a permit has been issued, the DPS building official shall conduct a final inspection pursuant to 780 CMR 115.5.

E. Beneficial and Temporary Occupancy:

1. Beneficial (partial) Occupancy:
   a. DCAMM may allow beneficial (partial) occupancy of portions of a building in order to allow a User Agency to set up and test their own operational equipment in select building areas. It does not allow for use and/or occupancy of the general public when, in fact, the building cannot function for the use(s) it is intended to accommodate, nor when there are outstanding items that effect health, safety and/or function.
   b. It is DCAMM policy to disallow beneficial occupancy if the fire alarm and suppression systems are inoperative.
   c. Beneficial occupancy of building areas shall not constitute Substantial Completion, or Final Acceptance of work by DCAMM, and shall not institute the guarantee period for any work.
   d. A punch list will be developed for building areas to receive beneficial occupancy and the building areas will be photographed prior to such occupancy of said portion or portions of the work.

2. Temporary Occupancy:
   a. When, according to 780 CMR 120.3 – Temporary Occupancy upon the request of the holder of a permit, a Temporary Certificate of Occupancy (TCO) may be issued before the completion of the entire work covered by the permit, provided that such portion or portions shall be occupied safely prior to full completion of the building or structure without endangering life or public welfare. The Building Official may consult with all Subcontractor Inspectors for issues pertaining to life safety and shall consult with the Fire Official pertaining to issues of adequacy of fire protection systems prior to the issuance of a Temporary Certificate.
   b. The Building Official may issue a Temporary Certificate of Occupancy (TCO) that can allow public use and occupancy of said portion or portions of the work, subject to punch list(s) being established prior to such occupancy.
   c. Issuance of a Department of Public Safety (DPS) Temporary Certificate of Occupancy (TCO) does not relieve the General Contractor of the DCAMM requirements of the contract and does not constitute Substantial Completion of the project.
   d. Temporary Occupancy of building areas will institute the guarantee period for completed work of all Divisions except 21 through 28 of the Specifications for those building areas so used and occupied, exclusive of remaining work indicated on associated punch lists. Use of systems provided under Divisions 21 through 28 of the Contract Documents for temporary services and facilities shall not constitute Substantial Completion, or Final Acceptance of work by DCAMM, and shall not institute the guarantee period.
      (1) If it is determined that there are no items on the punch list that affect health, safety or function and it is agreed by the Building Official, the Designer and the DCAMM Project Manager that the entire building can be granted a Temporary Certificate of Occupancy (TCO), the work of all Divisions including 21 through 28 of the Specifications for the entire building so used and occupied, exclusive of remaining work indicated on associated punch lists, will institute the guarantee period for completed work of all Divisions including the systems provided under Divisions 21 through 28.
      (2) Whereas a User Agency cannot properly maintain building systems without operating and maintenance documentation, subcontractors for Divisions 21 through 28 will be responsible for maintaining their respective building systems at no additional cost to the contract until the project is substantially complete and Operating and Maintenance (O & M) manuals, reviewed and approved by the Designer, are provided to the DCAMM Project Manager.
      (3) Issuance of a Temporary Certificate of Occupancy (TCO) may require remaining punch list work to be completed during irregular work hours. Such work will be performed at no additional cost to the contract.
   e. The following DCAMM criteria, and any other criteria that may be imposed by the Building Official, are required for a DPS Temporary Certificate of Occupancy (TCO):
      (1) Upon receipt of the General Contractor's list of items to be completed or corrected, the Designer will promptly make a thorough inspection, together with representatives of DCAMM and the Operating Agency, and prepare a "punch list", setting forth in accurate detail any items on the General Contractor's list and additional items that are not acceptable. The Designer and DCAMM Project Manager will identify and tag (by asterisk) all items that, in their opinion, affect health, safety or function. The Building Official

may include additional items that, in her/his opinion, affect items that endanger life or public welfare.

(2) When the punch list has been prepared, and all DPS Inspector comments* have been included, the General Contractor shall immediately correct all punch list items that affect health, safety or function (all asterisked items). This work must be completed before the issuance of a DPS Temporary Certificate of Occupancy (TCO).

* NOTE: If a DPS inspector (including, but not limited to AABA, boiler, elevator or any other authorized inspector) requires modifications and/or additions that were not included in the construction documents, the Designer should review the applicable code(s) and provide written interpretation to the DCAMM Project Manager together with their recommendations.

f. Exclusive of other items that the DPS inspector may impose, there is a history of specific items that are essential for, temporary occupancy. These items include, but are not limited to the following:

(1) Properly colored and positioned exit signs.
(2) Properly located emergency lighting fixtures.
(3) Clean ducts, blowers, and coils if units were operated without filters during construction.
(4) Install permanent filters and replace disposable filters if units were operated during construction.
(5) Properly working lock for the medical environmental closets (if applicable).
(6) Assure that exterior and interior fire rated and egress doors are operating properly and have the proper hardware.
(7) Assure that smoke barriers are properly installed and located.
(8) Assure that proper water pressure is provided for the sprinkler system.
(9) Assure that proper hot water temperatures are provided. Unless otherwise specified or required by a User Agency, the temperature set on building master controllers of hot water shall apply:
   (a) HW to toilet rooms and janitors closets shall be 140˚ F.
   (b) HW to individual tubs or showers shall be controlled, in addition to the master controller above, with thermostatic valves set to furnish HW at a temperature not exceeding 110˚ F and equipped with anti-scald feature.
   (c) HW rinse water to dishwashers shall be controlled at 180˚ F.
(10) Emergency eyewash equipment must be hard-plumbed and employ tempered water.

g. Evidence of compliance with requirements of governing authorities including, without limitations, the following:

1) Certificate of Inspection, in form of signed permits from the electrical, plumbing, gas, fire department, boiler, and any other required inspectors.
2) Certification from the local fire department to the effect that all detection, alarm and suppression systems, and other equipment or systems under fire department jurisdiction are approved.
3) When carpeting and/or draperies are provided, a flame, smoke and fuel-rating certificate provided by the supplying General Contractor.
4) Elevator certification(s) from the elevator inspector obtained through the General Contractor's elevator subcontractor.
5) A letter from the Plumbing Subcontractor that the potable water supply has been sanitized.

6) Septic system certification obtained from the town by the General Contractor (when applicable).
7) Pressurized vessel certifications from the boiler inspector obtained through the Mechanical Subcontractor.
8) When air balancing is required, the air balancing report prepared by the Mechanical Subcontractor (or commissioning agent, when applicable).
9) When smoke control/fire emergency ventilation system is required, the test report prepared by the Mechanical Subcontractor (or commissioning agent, when applicable).
10) Evidence of test and approval for Department of Environmental Protection (DEP) and Department of Public Health (DPH), when applicable.

F. Prerequisites for DCAMM Certificate of Agency Use and Occupancy: DCAMM Certificate of Agency Use and Occupancy E-1 Form. Prior to requesting a Division of Capital Asset Management and Maintenance (DCAMM) Certificate of Agency Use and Occupancy, the DCAMM Resident Engineer will procure and have ready and available the following approved items (referred to as Closeout Submittals):

1. Operating and maintenance (O & M) manuals and written operating instructions for the various systems.
2. Catalog data sheets for each item of mechanical or electrical equipment actually installed including performance curves, rating data and parts lists.
3. Catalog sheets, maintenance manuals, and approved shop drawings of all mechanical and electrical equipment controls and fixtures with all details clearly indicated, including size of lamps.
4. Balancing report.
5. Names, addresses, and telephone numbers of repair and service companies for each of the major systems installed under the construction contract.
6. Signed Department of Public Safety (DPS) Certificate of Occupancy per 780 CMR 120.0
7. Licensed Builder Final Affidavit/Report.
8. Designer Affidavit of Compliance.
9. Subcontractor Affidavits that specified equipment and installed items have been seismically braced in accordance with code requirements.
10. Monetized punch list of the remaining Work that must be done before Final Acceptance.
11. As-built documents should be completed (both electronic files and transparencies) and ready to transfer over to the DCAMM Project Manager. As-built documents shall consist of, but not be limited to, the following:
    a. Drawings (in AutoCAD ver. 2000 or later format)
        1) Contract drawings, for all disciplines, marked-up to clearly indicate as-built conditions.
        2) All clarification and/or changed conditions sketches (SK's).
    b. Specifications (in .pdf format)
        1) All construction specifications.
        2) All addenda.
    c. Shop drawings, submittals, etc. (scanned format)*
        1) All approved shop drawings, submittals, etc.
12. Approved documents submitted to the DCAMM or the Designer shall be electronically scanned (including the associated transmittals and, where applicable, the Designer-of-Record's and DCAMM's comments) as a .pdf document. All scanned approved submittals shall be included on a CD.

13. The electronic file names, for each approved submittal, shall contain the following information:
    a. For APPROVED or APPROVED AS NOTED Shop Drawings:
        1) Project Number Submittal's Date, APPROVED, Submittal Name, Submittal's Specification Section Name and Number, and Submittal's Revision Number.
        2) As an example, the file name of an approved submittal for Concrete
            a) Design Mix: DFS991DC1 030106 APPROVED Concrete Design Mix Cast In Place Concrete 033000 Rev0.PDF
    b. For Shop Drawings submitted for information only, e.g. welders certificate, the electronic file name shall contain the following information:
        1) Project Number Submittal's Date, FORINFO, Submittal Name, Submittal's Specification Section Name and Number, and Submittal's Revision Number.
        2) As an example the file name of a for information only submittal for a welder's certificate:
            a) DFS991DC1 030106 FOR INFO Welders Certificate Quality Requirements 014000 Rev0.PDF
    c. Unless otherwise stated all submitted documents shall include an electronic scanned image as noted above.
    d. The electronic file name shall be printed on every shop-drawing page.
14. The DCAMM Project Manager will attach the monetized punch list to the DCAMM Certificate of Agency Use and Occupancy, indicate the official date of Use and Occupancy, establish the date upon which all remaining punch list items must be completed (normally 30-45 calendar days), and procure appropriate signatures on the original and seven (7) copies.
15. After receipt of signatures, the DCAMM Project Manager will distribute the signed copies.
16. Project schedules (in Primavera format, unless otherwise authorized), baseline, and all updates.
17. Notification to Operating Agency and/Or User Agency of Proposed Use and Occupancy Date: The DCAMM Project Manager is to notify the Operating Agency and/or User Agency of the project Use and Occupancy date at least seven (7) calendar days in advance.

G. Prerequisites for DCAMM Certificate of Final Inspection, Release, and Acceptance: DCAMM Final Certificate of Final Inspection, Release, and Acceptance (E-2 Form). Upon receipt of the DCAMM Certificate of Agency Use and Occupancy, and its adjunct monetized punch list, the General Contractor shall cause the completion of all of the other punch list items within timeframe required by said certificate, but not more than 45 calendars days if the timeframe is not indicated on the said certificate.

1. If the General Contractor fails to pursue completion of the remaining monetized punch list work, on a continual basis, within the timeframe required by the certificate, DCAMM may, after seven (7) calendar days written notice, elect to complete the work with separate forces and charge the work against the General Contractor.
2. At the end of the General Contractor's one (1) year guarantee period, the General Contractor shall transfer manufacturers' equipment and material warranties that are still in force to the Operating Agency.

1.7 GUARANTEES AND WARRANTIES

A. Submit to the Designer all extended guarantees and warranties that have been specified in various, individual Sections of the Specifications. Guarantees shall be assembled by Specification No. and Section in accordance with Specifications Table of Contents.

1. Guarantees and warranties shall be enforceable in the Commonwealth of Massachusetts and subject to interpretation in accordance with the laws of the Commonwealth of Massachusetts.
2. Guarantees and warranties shall begin at the date of Substantial Completion of the Project. Guarantees and warranties which start at the date of shipment from the factory, or from the completion date of an individual portion of the project, are not acceptable.

B. Unless more stringent requirements are otherwise specified, guarantee all work against defects of materials, equipment and workmanship for one year from the date of Substantial Completion or the date of issue of Certificate of Use and Occupancy for the building or portion thereof, whichever occurs first.

C. If, within any guarantee period, repairs or changes are required in connection with guaranteed work, General Contractor shall promptly upon receipt of notice from DCAMM, and without additional expense to DCAMM, within ten business days:

1. Place in satisfactory condition in every particular all guaranteed work and correct all defects.
2. Make good all damage to building, site equipment, or contents thereof, including redecoration which, in the opinion of the Designer, results from the use of material, equipment or workmanship which are inferior, defective or not in accord with the terms of the Contract.

D. If General Contractor, after such notice, fails to proceed immediately to comply with terms of guarantee, DCAMM may correct defects and hold General Contractor liable for all expenses incurred.

E. Promptly after completion of the work, obtain from each Subcontractor where a guarantee is required, a warranty addressed to and in favor of DCAMM or the User Agency if directed by DCAMM.

F. Delivery of any warranty required does not relieve the General Contractor from any obligation assumed under other provisions of the Contract.

G. Deliver guarantees and warrantees to the Designer before or with the application for Final Payment.

H. The general warranty set forth in the General Conditions is in addition to, exclusive of, and not in substitution of such guarantees as may be required in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 024119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Pre-demolition Photographs or Video: Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is included in the Contract Documents. Examine report to become aware of locations where hazardous materials are present.
   1. Hazardous material remediation is specified elsewhere in the Contract Documents.

2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 078413

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
2. Fire-resistive joint systems for floor, wall, and head-of-wall joints.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 230001 - HEATING, VENTILATING AND AIR CONDITIONING for duct and piping penetrations.
2. Section 260001 - ELECTRICAL WORK for cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated, as determined per ASTM E 814.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Either a firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors" or a firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction of a minimum of five projects with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

    a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed in the UL “Fire Resistance Directory.”

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3.

1. BioFireshield; RectorSeal Corporation.
2. Hilti, Inc.
3. Specified Technologies, Inc. (STI).
4. 3M; Fire Protection Products Division.

2.2 FIRESTOPPING MATERIALS

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Materials: Provide through-penetration firestop systems containing primary materials and fill materials which are part of the tested assemblies indicated in the Through-Penetration Firestop System Schedule at the end of Part 3. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated

2.3 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Independent Testing Agency: Cooperate with the Independent Testing Agency engaged by DCAMM for field quality control activities for the Work of this Section. Refer also to Section 014325 - TESTING AGENCY SERVICES.

B. Commissioning Authority: Cooperate with the Commissioning Authority engaged by DCAMM for field quality control activities for the Work of this Section. Refer also to Section 019115 - FACILITY EXTERIOR ENCLOSURE COMMISSIONING.

C. Cooperate with field quality control personnel. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

D. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at Contractor's expense.

E. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

F. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.5 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

CONCRETE FLOORS		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	F-RATING HR	HILTI	STI	3M	BIO-FIRE
CIRCULAR BLANK OPENINGS	1	FA 0006, CAJ 0070	C-AJ-0094, C-AJ-0100	CAJ 0009	CAJ 0056
	2	FA 0006, CAJ 0070	C-AJ-0094, C-AJ-0100	CAJ 0009	CAJ 0056
	3	CAJ 0055	C-AJ-0014	CAJ 0009	CAJ 0056
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278, FA 1017	C-AJ-1080, C-AJ-1240, F-A-1110	CAJ 1058	CAJ 1264
	2	CAJ 1226, CAJ 1278, FA 1017	C-AJ-1080, C-AJ-1240, F-A-1110	CAJ 1058	CAJ 1264
	3	CAJ 1226, CAJ 1278, FA 1017	C-AJ-1080, C-AJ-1240, F-A-1110	CAJ 1058	CAJ 1264
	4	CAJ 8095, CBJ 1034	C-AJ-1217	CAJ 1044	N/A
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, CAJ 2168, FA 2054, FA 2067	C-AJ-2297, F-A-2192, F-A-2210	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2131
	2	CAJ 2109, CAJ 2168, FA 2054, FA 2067	C-AJ-2297, F-A-2192, F-A-2210	CAJ 2189, CAJ 2117	CAJ 2131
	3	CAJ 2109, CAJ 2168, FA 2054,	C-AJ-2297, F-A-2192	CAJ 2005, CAJ 2117	CAJ 2152
	4	N/A*	C-AJ-2364	N/A*	N/A
SINGLE OR BUNDLED CABLES	1	FA 3007, CAJ 3095,	C-AJ-3154, F-A-3021, F-A-3037	CAJ 3021	CAJ 3103
	2	FA 3007, CAJ 3095,	C-AJ-3154, F-A-3021, F-A-3037	CAJ 3021	CAJ 3103
	3	FA 3007, CAJ 3095,	C-AJ-3154, F-A-3021, F-A-3037	CAJ 3030	CAJ 3103
	4	N/A*	C-AJ-3154, C-AJ-3214	N/A*	N/A
CABLE TRAY	1	CAJ 4034, CAJ 4054, CAJ 4017	C-AJ-4029, C-AJ-4088	CAJ 4003	CAJ 4048
	2	CAJ 4034, CAJ 4054, CAJ 4017	C-AJ-4029, C-AJ-4088	CAJ 4003	CAJ 4048
	3	CAJ 4034, CAJ 4017	C-AJ-4029, C-AJ-4060	CAJ 4003	CAJ 4048
	4	N/A*	N/A*	N/A*	N/A

CONCRETE FLOORS (CONTINUED)		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	**F-RATING HR**	**HILTI**	**STI**	**3M**	**BIO-FIRE**
SINGLE INSULATED PIPES	1	FA 5016, FA 5017, CAJ 5090, CAJ 5091,	C-AJ-5079, C-AJ-5087, F-A-5041	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	2	FA 5016, FA 5017 CAJ 5090, CAJ 5091,	C-AJ-5079, C-AJ-5087, F-A-5041	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	3	FA5016, CAJ 5061, CAJ 5090,	C-AJ-5079, C-AJ-5029, F-A-5041	CAJ 5024, CAJ 5017	CAJ 5006
	4	CBJ 5006	N/A*	N/A*	N/A
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	CAJ 6026
	2	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	CAJ 6026
	3	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	N/A
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046 CAJ 7051	C-AJ-7023, C-AJ-7027	CAJ 7003, CAJ 7021	CAJ 7036
	2	CAJ 7046 CAJ 7051	C-AJ-7023, C-AJ-7027	CAJ 7003, CAJ 7021	N/A
	3	CAJ 7046 CAJ 7051	C-AJ-7023, C-AJ-7027	CAJ 7003, CAJ 7021	N/A
MIXED PENETRANTS	1	CAJ 8056, CAJ 8095, CAJ 8099	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	2	CAJ 8056, CAJ 8095, CAJ 8099	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	3	CAJ 8056, CAJ 8095, CAJ 8099	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	4	CAJ 8095	N/A*	N/A*	N/A

CONCRETE OR BLOCK WALLS		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	**F-RATING**	**HILTI**	**STI**	**3M**	**BIO-FIRE**
CIRCULAR BLANK OPENINGS	1	CAJ 0055, CAJ 0070	C-AJ-0094, C-AJ-0100	CAJ 0009	CAJ 0056
	2	CAJ 0055, CAJ 0070	C-AJ-0094, C-AJ-0100	CAJ 0009	CAJ 0056
	3	CAJ 0055	C-AJ-0014	CAJ 0009	CAJ 0056
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278,	C-AJ-1080	CAJ 1058	CAJ 1264
	2	CAJ 1226, CAJ 1278,	C-AJ-1080	CAJ 1058	CAJ 1264
	3	CAJ 1226, CAJ 1278,	C-AJ-1080	CAJ 1058	CAJ 1264
	4	CAJ 8095, CBJ 1034, WJ 1042	W-J-1170	CAJ 1044	WJ 1064
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, WJ 2108, WJ 2121	W-J-2076, C-AJ-2297	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2131
	2	CAJ 2109, WJ 2108, WJ 2121	W-J-2076, C-AJ-2297	CAJ 2189, CAJ 2117, CAJ 2027	CAJ2131
	3	CAJ 2109, CAJ 2168, WJ 2091	C-AJ-2297, W-J-2085	CAJ 2005, CAJ 2117, CAJ 2027	CAJ2152
	4	WJ 2091	W-J-2085, W-J-2217	N/A*	N/A
SINGLE OR BUNDLED CABLES	1	CAJ 3095, WJ 3060 WJ 3074	W-J-3090, W-J-3180	CAJ 3021	WJ 3071
	2	CAJ 3095, WJ 3060 WJ 3074	W-J-3090, W-J-3180	CAJ 3021	WJ 3071
	3	CAJ 3095, WJ 3050	C-AJ-3154, C-AJ-3214	CAJ 3030	CAJ 3103
	4	WJ 3050	C-AJ-3154, C-AJ-3214	N/A*	N/A
CABLE TRAY	1	CAJ 4034, CAJ 4054, WJ 4016,	C-AJ-4029, C-AJ-4088	CAJ 4003	CAJ 4048
	2	CAJ 4034, CAJ 4054, WJ 4016,	C-AJ-4029, C-AJ-4088	CAJ 4003	CAJ 4048
	3	CAJ 4034, WJ 8007	C-AJ-4029, W-J-4068	CAJ 4003	CAJ 4048
	4	WJ 8007	W-J-4066, W-J-4068	N/A*	N/A

CONCRETE OR BLOCK WALLS (CONT)		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	**F-RATING**	**HILTI**	**STI**	**3M**	**BIO-FIRE**
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, WJ 5042	W-J-5005, W-J-5012	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	2	CAJ 5090, CAJ 5091, WJ 5042	W-J-5005, W-J-5012	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	3	CAJ 5090, CAJ 5091,	C-AJ-5079, C-AJ-5029	CAJ 5024, CAJ 5017	CAJ 5006
	4	WJ 5028, CBJ 5006	W-J-5072	N/A*	N/A
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	CAJ 6026
	2	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	CAJ 6026
	3	CAJ 6006, CAJ 6017	C-AJ-6003, C-AJ-6019	CAJ 6001, CAJ 6002	N/A
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046, WJ 7029, WJ 7022	W-J-7089, W-J-7005, W-J-7092	CAJ 7003, CAJ 7021	CAJ 7036
	2	CAJ 7046, WJ 7029, WJ 7022	W-J-7089, W-J-7005, W-J-7092	CAJ 7003, CAJ 7021	CAJ 7036
	3	CAJ 7046 CAJ 7051	C-AJ-7023, C-AJ-7027	CAJ 7003, CAJ 7021	N/A
MIXED PENETRANTS	1	CAJ 8096, CAJ 8099 WJ 8007	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	2	CAJ 8096, CAJ 8099 WJ 8007	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	3	CAJ 8099 WJ 8007	C-AJ-8093, C-AJ-8113, C-AJ-8181	CAJ 8001, CAJ 8013	CAJ 8051
	4	WJ 8007	N/A*	N/A*	N/A

WOOD FLOORS		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	**F-RATING**	**HILTI**	**STI**	**3M**	**BIO-FIRE**
METAL PIPES OR CONDUIT	1	FC 1009, FC 1059	F-C-1074	FC 1002	FC 1031
	2	FC 1009, FC 1059	F-C-1074	FC 1002	FC 1031
NON-METALLIC PIPE OR CONDUIT	1	FC 2025, FC 2126	F-C-2032, F-C-2157	FC 2024	FC 2059
	2	FC 2025, FC 2126	F-C-2044, F-C-2020	FC 2024	FC 2059
SINGLE OR BUNDLED CABLES	1	FC 3012, FC 3044	F-C-3010	FC 3017	FC 3050
	2	FC 3012	F-C-3013	FC 3017	N/A
INSULATED PIPES	1	FC 5004, FC 5036, FC 5037	F-C-5043	FC 5014	FC 5025
	2	FC 5004	F-C-5043	N/A*	FC 5025
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	FC 7013	F-C-7014, F-C-7023	FC 7001	
MIXED PENETRANTS	1	FC 8014, FC 8026	F-C-8036, F-C-8045, F-C-8029	FC 8013	N/A
	2	N/A*	F-C-8001	N/A*	N/A

GYPSUM WALLBOARD ASSEMBLIES		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	**F-RATING**	**HILTI**	**STI**	**3M**	**BIO-FIRE**
METAL PIPES OR CONDUIT	1	WL 1054, WL 1164	W-L-1049	WL 1146	WL 1115
	2	WL 1054, WL 1164	W-L-1049	WL 1010, WL 1146	WL 1115
	4	WL 1110	W-L-1171	WL 1001	
NON-METALLIC PIPE OR CONDUIT	1	WL 2078, WL 2075, WL 2128	W-L-2100, W-L-2048, W-L-2237	WL 2088, WL 2002	WL 2133
	2	WL 2078, WL 2075, WL 2128	W-L-2100, W-L-2048, W-L-2237	WL 2088, WL 2002	WL 2133
	4	WL 2184, WL 2245	W-L-2293, W-L-2507	N/A*	
SINGLE OR BUNDLED CABLES	1	WL 3065	W-L-3210, W-L-3377	WL 3032, WL 3030	WL 3153
	2	WL 3065	W-L-3210, W-L-3377	WL 3032, WL 3030	WL 3153
	4	WL 3139	W-L-3211, W-L-3377	N/A*	
CABLE TRAY	1	WL 4011, WL 4019	W-L-4043, W-L-4079	WL 4004	WL 4032
	2	WL 4011, WL 4019	W-L-4043, W-L-4079	WL 4004	WL 4032
	4	WL 8014	W-L-4076	N/A*	
INSULATED PIPES	1	WL 5029, WL 5096	W-L-5014, W-L-5054, W-L-5091	WL 5040, WL 5001, WL 5032	WL 5062
	2	WL 5029, WL 5096	W-L-5014, W-L-5054, W-L-5091	WL 5040, WL 5001, WL 5032	WL 5062
	4	WL 5073	W-L-5158	N/A*	
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7040, WL 7042	W-L-7026, W-L-7149, W-L-7164	WL 7008	WL 7037
	2	WL 7040, WL 7042	W-L-7026, W-L-7149, W-L-7164	WL 7008, WL 7013, WL 7016	WL 7037
MIXED PENETRANTS	1	WL 8004, WL 8013	W-L-8050, W-L-8073	WL 8010	WL 8017
	2	WL 8004, WL 8013	W-L-8050, W-L-8073	WL 8010, WL 8002	WL 8017
	4	WL 8014	N/A*	N/A*	

* No UL-Classified system is available as of August 2003. Engineer Judgment Drawing Required.

NOTES:

1. Jobsite conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected.
2. If jobsite conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgment Drawings.
3. Coordinate work with other trades to assure that penetration-opening sizes are appropriate for penetrant locations, and vice versa.
4. For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgment drawing.
5. The Contractor shall verify that the schedule is current at the time of construction, and that each referenced system is suitable for the intended application.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
   1. Products:
      a. Dow Corning Corporation; 786 Mildew Resistant.
      b. GE Silicones; Sanitary SCS1700.
      c. Tremco; Tremsil 200.
   2. Type and Grade: S (single component) and NS (nonsag).
   3. Class: 25.
   4. Use Related to Exposure: NT (nontraffic).
   5. Uses Related to Joint Substrates: G, A, and O.

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 C 1330, Type C (closed-cell material with a surface skin) O (open-cell material) B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. 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. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates 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. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Porcelain enamel.
      d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   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. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
   1. Joint Sealant: Single-component mildew-resistant acid-curing silicone sealant.
   2. Joint-Sealant Color: As selected from manufacturer’s full-range.

END OF SECTION 079200

SECTION 096723

RESINOUS FLOORING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Resinous flooring system.
2. Sealing of floor penetrations.

1.3 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system and a urethane topcoat.
B. The system shall have the color and texture as specified by the Owner with a nominal thickness of 3/16 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
C. Cove base to be applied per manufacturers standard details unless otherwise noted.
D. Floor penetrations to receive backer rod and joint filler / sealer per manufacturer’s details unless otherwise noted.

1.4 SUBMITTALS

A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
B. Manufacturer’s Material Safety Data Sheet (MSDS) for each product being used.
C. Samples: A 3 x 3 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

1.5 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. No requests for substitutions shall be considered that would change the generic type of the specified System.
D. System shall be in compliance with requirements of United States Department of Agriculture (USDA),
Food, Drug Administration (FDA), and local Health Department.
E. System shall be in compliance with the Indoor Air Quality requirements of California section

01350 as verified by a qualified independent testing laboratory.

F. A pre-installation conference shall be held between Applicator, General Contractor and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping
   1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection

   1. Dry storage area shall be provided for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
   2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.

C. Waste Disposal

   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.7 PROJECT CONDITIONS

A. Site Requirements

   1. Application may proceed while air, material and substrate temperatures are between 50 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
   2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
   3. Application may proceed with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Safety Requirements

   1. The Owner shall be responsible for the removal of foodstuffs from the work area.
   2. Non-related personnel in the work area shall be kept to a minimum.

1.8 WARRANTY

A. Manufacturer warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to manufacturer’s published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.
B. Manufacturer liability with respect to this warranty is strictly limited to the value of the material purchase.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Product: Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108, Phone: (860) 528-9838, Fax: (860) 528-2802

B. Manufacturer of Approved System shall be single source and made in the USA.

2.2 FLOORING

A. Dur-A-Flex, Inc, Poly-Crete MD (self leveling) topcoat seamless flooring system and urethane topcoat.

1. System Materials:
   a. Primer: Dur-A-Flex, Inc, Poly-Crete TF Plus, resin, hardener and activator powder.
   b. Topping: Dur-A-Flex, Inc, Poly-Crete MD resin, hardener and aggregate.
   c. Topcoat: Dur-A-Flex, Inc, Poly-Crete COLOR-FAST resin, hardener and powder aggregate.

2. Patch Materials
   a. Shallow Fill and Patching: Dur-A-Flex, Inc. Poly-Crete MD (up to ¼ inch).
   b. Deep Fill and Sloping Material (over ¼ inch): Dur-A-Flex, Inc. Poly-Crete WR.

2.3 PRODUCT REQUIREMENTS

A. Primer	Poly-Crete TF Plus
1. Percent Solids	100 %
2. VOC	0 g/L
3. Compressive Strength ASTM C 579	7,250 psi
4. Tensile Strength, ASTM D 638	750 psi
5. Flexural Strength ASTM D 790	4,400 psi
6. Abrasion Resistance, ASTM C 501 H 10 Wheel, 1,000 gm load, 1,000 cycles	900 mg weight loss
7. Hardness, Shore D	85
8. Potlife @ 70 F	15 minutes
B. Topping	Poly-Crete MD
1. Percent Reactive	100 %
2. VOC	0 g/L
3. Bond Strength to Concrete ASTM D 4541	400 psi, substrates fails
4. Compressive Strength, ASTM C 579	7,400 psi
5. Tensile Strength, ASTM D 638	1,800 psi
6. Impact Resistance @ 125 mils, MIL D-3134, No visible damage or deterioration	>160 inch lbs
C. Topcoat	Poly-Crete COLOR-FAST
1. Percent Solids	100%
2. VOC	0 g/L
3. Compressive Strength, ASTM C 579	7,800 psi
4. Tensile Strength, ASTM D 638	4,200 psi
5. Flexural Strength, ASTM D 790	1,000 psi
6. Abrasion Resistance, ASTM D 4060 CS-17 wheel, 1,000gm load, 1,000 cycles	45 mg loss
7. Impact Resistance, ASTM D 1709	160 in.lbs
8. Shore D Hardness, ASTM D 2240	65

9. Gloss, ASTM D 523, 60^0 Semi-gloss appearance

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.

1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 PREPARATION

A. General

1. Existing surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
. a. Perform anhydrous calcium chloride test ASTM F 1869-98. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.
   b. Perform relative humidity test using is situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99% relative humidity level measurement.
   c. If the vapor drive exceeds 99% relative humidity or 20 lbs/1,000 sf/24 hrs then the Owner and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.
3. Mechanical surface preparation
   a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-6 as described by the International Concrete Repair Institute.
   b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   c. Wherever a free edge will occur, including doorways, wall perimeters, expansion joints, columns, doorways, drains and equipment pads, a ¼ inch deep by 3/16 inch wide keyways shall be cut in.
   d. Cracks and joints (non-moving) greater than 1/4 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and
   patch per manufactures recommendations.

3.3 APPLICATION

A. General

1. The system shall be applied in four distinct steps as listed below:
   a. Substrate preparation

b. Primer
c. Topping/overlay application
d. Topcoat application

2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Primer

1. The primer shall be applied with a coverage rate of 80-90 sf/kit.
2. The topcoat shall be comprised of a liquid resin, liquid hardener and activator powder kit and installed per the manufacturer's recommendations.

C. Topping

1. The topping shall be applied as a self-leveling system as specified. The topping shall be applied in one lift with a nominal thickness of 3/16 inch.
2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
4. The topping shall be applied over horizontal surfaces using a pin rake, trowels or other systems approved by the Manufacturer.
5. Immediately upon placing, the topping shall be degassed with a 15/16 inch spiked roller.

D. Penetrations

1. Penetrations through the floor substrate surface shall be properly cleaned and enlarged to 1/2" wide x 1" deep around the perimeter of the penetration to allow for the placement of backer rod and joint filler / sealer.
2. Topping shall be held back 1/2" from the face of the penetration for the placement of joint filler / sealer beveled away from the penetration and sealed to the penetration and floor topping in accordance with the manufacturer's approved detail.

E. Topcoat

1. The topcoat shall be mixed and applied per manufacturer recommended procedure.
2. The topcoat shall be comprised of three components, a resin, hardener and filler as supplied by the manufacturer.
3. The topcoat will be applied at the rate of 100 sf/kit (1.1 gal).
4. The finish floor will have a nominal thickness of 3/16 mils.

3.4 FIELD QUALITY CONTROL

A. Tests, Inspection

1. The following tests shall be conducted by the Applicator:
    a. Temperature
        1. Air, substrate temperatures and, if applicable, dew point.
    b. Coverage Rates
        1. Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.5 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION 096723

SECTION 114000

FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.01 PROVISIONS

A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

A. Work Included: Food Service Equipment, including but not limited to, the following:

1. Equipment as shown on Foodservice Drawings and Itemized Specifications, Specifications indicate minimum acceptable products.

2. Uncrating, assembling, rigging setting, leveling, and properly and securely fastening to wall or floor as required with all necessary items such as braces, filler pieces and related items.

3. Furnish, erect and maintain staging and scaffolding, including mechanical hoisting equipment, required for the performance of the Food Service Equipment Subcontractor's work.

4. Plumbing, electrical, steam, and general accessories for items specified in this section, including, but not limited to faucets, strainers, lever-wastes, tail pieces, control valves, cords and plugs, and disconnects provided as standard with the equipment. Furnish to the proper mechanical or electrical trades for the final connection of utility services. Tag each item with the equipment number for easy reference.

B. Related Work Specified in other sections, KEC is not responsible for providing or installing:

1. Plumbing Work:
   a. Hose bibs
   b. Final gas and plumbing connections
   c. Water pressure regulators
   d. Traps, tail pieces, valves, stops and shutoff valves
   e. Grease traps
   f. Backflow prevention
   g. Floor sinks
   h. Pressure Reducing Valves

2. Heating, Ventilating and Air Conditioning:
   a. Final duct connections
   b. Exhaust and supply fans
   c. Ductwork

d. Fan switches

3. Electrical Work:
   a. Final electrical connections
   b. Disconnect switches
   c. Receptacles
   d. Ballasts
   e. Control Wiring
   f. Internal wiring to a control panel or switch

1.03 SUBMITTALS

A. Shop Drawings: Prepare separate plans for layout, electrical, plumbing and building conditions/HVAC plans at a scale of 1/4 inch to the foot showing dimension location, size, height above finished floor and, where necessary, capacity of mechanical services required for each item of equipment. Foodservice Contract Documents shall not be reproduced and represented as submittal documents.

B. Equipment: Prepare detailed drawings at a minimum scale of 3/4 inch to the foot, plus necessary cross sections at a scale of 3/4 inch to the foot, showing complete details of each item of custom manufacture. Include accurately dimensioned layouts and locations for floor depressions if required or called for in these specifications. Include accurately dimensioned details and locations of special wall openings where items of equipment extend through walls.

C. Product Data: Submit brochures containing illustrations, specifications, accessories, line drawings and rough-in information on brand name items (items not of custom manufacture).

D. O & M Manuals: Submit operation and maintenance manuals containing installation, operating, maintenance and warranty information on brand name items (items not of custom manufacture).

E. LEED Submittals: Demonstrate compliance with the following criteria, in compliance with Specification Section 018113 – Sustainable Design Requirements:

1. EA Prerequisite 3 and Credit EA 4: Manufacturer’s product data for refrigeration systems, including printed manufacturers’ statements indicating that not CFC-based refrigerants are used.

2. Credit EQ 4.1: Manufacturer’s product data for adhesives and sealants, including printed statement of VOC content.

1.04 QUALITY ASSURANCE

A. Qualification of Fabricators

1. To fabricate equipment such as tables, sinks, and counter tops, described in these specifications other than by name and catalog numbers, employ an equipment fabricator who has the plant, personnel and engineering facilities to properly design and manufacture high quality equipment. The fabricator shall be subject to the approval of

Architect, Owner and Colburn and Guyette. Work in the above category shall be manufactured by one manufacturer of standard unit assembly and uniform design and finish.

2. The Food Service Equipment Subcontractor for the equipment as specified in this section shall be a recognized distributor for these items of equipment which are of other manufacture than his own.

3. Equipment to be supplied under this section of the specifications will not be acceptable unless the Food Service Equipment Subcontractor furnishes evidence that equipment of approximately the same type and design has been installed elsewhere and has been operating successfully for at least 5 years. Equipment installed for test or prototype will not be considered acceptable.

B. Fabricate and install equipment to meet Local, State and National Board of Health regulations. Perform work and provide materials in full accordance with latest rules of U.S. Public Health Services, National Board of Fire Underwriters, and local or State Ordinances, regulations of State Fire Marshall and Underwriters Laboratory.

C. Reference Standards:

1. NSF Standards: Comply with applicable National Sanitation Foundation standards and recommended criteria. Provide each principal item of food service equipment with a "Seal of Approval" by NSF.

2. UL Labels: Where available, provide UL Labels on items of food service equipment with prime electrical components. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL, where available.

3. ANSI Standards: Comply with applicable ANSI standards for gas-burning appliances, for piping to compressed gas cylinders, and for vacuum breakers and air gaps to prevent siphonage in water piping (ANSI 221) series, B57. 1, A40.6 and A40.4).

4. NFPA Codes: Comply with "National Electrical Code:, and BOCA with NFPA No. 96 for exhaust system equipment, NFPA No. 17 & 17A for wet chemical extinguishing system equipment; and NFPA No. 54.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Properly package and protect equipment during shipping, handling, and storing to prevent damage.

B. Store indoors or under cover, on raised platforms, fully protected from dirt and moisture.

C. Measures must be taken to protect equipment after installation and before final turnover.

1.06 EXISTING CONDITIONS

A. Field Measurements: Check measurements at building and be responsible for making the food service equipment fit.

1. Examine the drawings and identify critical areas which might affect the fitting of equipment, aisles, installation, or other functional aspects of the equipment. Submit drawings which show structural measurements and dimensions which are critical to the proper execution and fitting of work.

1.07 WARRANTIES

A. New equipment specified for this facility shall be guaranteed for a period of one (1) year beginning on the date of the final acceptance of this section. Manufacturers shall provide their standard guarantees and warranties for work under this section. However, such guarantees and warranties shall be in addition to and not in lieu of the above stated one (1) year warranty as well as other liabilities which the Manufacturer and the Food Service Equipment Subcontractor may have by law or by other provisions of the Contract Documents.

1.08 EXISTING EQUIPMENT

A. Verify and document condition of equipment to be reused.

B. Confirm status of removed equipment with owner prior to any action taken.

C. All existing equipment to be re-used to be relocated and set in place by KEC and all MEP disconnect and reconnection by appropriate trades.

D. General Contractor responsible for any on site storage of existing equipment to be reused.

E. Remove and dispose of all existing equipment to be replaced.

F. Coordinate disconnect, capping and making safe of equipment utilities by General Contractor. Coordinate reconnect of all existing equipment with appropriate trades.

G. Coordinate all new equipment locations in the field with General Contractor to ensure proper placement as per equipment layout on Contract Documents.

H. Verify and coordinate all details, dimensions and utility requirements for all existing equipment to be re-used in the field with the General Contractor.

I. Provide General Cleaning of existing equipment to be reused.

1.09 SUBSTITUTIONS

A. All items identified in this section shall be provided as specified. Substitutions will be considered only if the following conditions have been satisfied, otherwise requests for substitutions shall be returned without action except to record noncompliance with the Contract Documents:

1. The Foodservice Drawings and Specifications have been designed and engineered based on the primary specification. Any and all coordination and cost associated with the incorporation of a substituted piece of equipment will be entirely the responsibility of the KEC. Including but not limited to engineering changes due to utility discrepancies,

instructions to G.C. and/ or subcontractors, providing proper clearances to adjacent structures, proper fit, conduit trenching and overhead utilities and any and all modifications to building or architectural elements.

2. All substitutions must be clearly listed in the bid proposal and shall include:
    a. Manufacturer/ model number
    b. Utility data
    c. Accessories
    d. A list of deviations from primary spec
    e. Shop drawings for exhaust hoods, walk-ins, accumulators/ conveyors, millwork, UDS systems, variable demand vent systems and any other items deemed worthy of extra attention/ coordination. Simply submitting cutsheets will not be accepted.

   An item with a listed manufacturer or "or equal" designation does not indicate that there is in fact a true equal. It is the responsibility of the KEC to assure that all alternates meet the original design intent and criteria of the primary spec.
   Primary manufacturer and model must be specified unless otherwise noted in Division 1 of the bidding instruction if Energy Star and Massachusetts State Plumbing Board Approved.

3. Revisions to Contract Documents are not required.

4. Proposed substitutions are in keeping with the general intent of Contract Documents.

5. The suggested substitutions is directly related to an "or equal" clause or similar language in the Contract Documents or as requested by the Owner/ Architect. Otherwise, provide as specified.

6. Proposed substitutions shall be equal in quality, durability, appearance, strength, design and approvals. If it is determined at any time by the owner or owner's rep prior to final acceptance that the substitution is not equal to primary spec, the KEC shall assume responsibility and all associated costs required to replace with the correct model.

7. Proposed substitutions shall perform equally the function imposed by the general design.

8. Proposed substitutions conform substantially, even with deviations, to the detailed requirements for the product identified in these specifications. Including, but not limited to, voltage, amperage, phase, MBTU, cold water connections, hot water connections, waste drains and exhaust/ supply CFM requirements, collar sizes and static pressure.

9. A substantial advantage is afforded the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Said advantages and responsibilities shall be fully outlined in the above noted submission requirements. Additional requirements to the Owner may include additional compensation to the Architect and Food Service Consultant for redesign and evaluation services, increased costs of other construction by the Owner or separate contractors, and similar considerations.

10. Proposed substitutions must meet all approvals and certifications of the originally

specified equipment, including but not limited to, Energy Star and Massachusetts State Plumbing Board Approval. Appropriate documentation is required to be submitted with the proposed substitutions.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Provide manufacturer's standard equipment except as otherwise noted in the Itemized Specification.

2.02 MATERIALS

A. Stainless steel (s/s): Non-corrodible alloy, or stainless steel, specified hereinafter type 304/305 stainless steel, having a standard analysis of 18 percent chrome and 8 percent nickel. (AISI type 304/305, hardest workable temper, No. 4 directional polish).

B. Galvanized steel sheet (GLV): Eight (8) coat galvanized copper bearing, used in largest possible sheets with as few joints as necessary. Painted hammer stone gray enamel unless otherwise specified. (ASTM A 526 except ASTM A 527 for extensive forming: ASTM A 525, G90 zinc coating chemical treatment.)

C. Steel sheet: ASTM A 569 hot-rolled or cold formed, carbon steel unless stainless steel is indicated.

D. Steel structural members: Hot-rolled or cold formed, carbon steel unless stainless steel is indicated.

E. Galvanized finish: ASTM 123 hot-dipped zinc coating.

F. Aluminum: ASTM B209/B221 sheet, plate, and extrusion (as indicated): Alloy, tempered finish as determined by manufacturer/fabricator, except 0.40 mil natural anodized finish on exposed work unless another finish is indicated.

G. Sealants: One-part or two-part, polyurethane or silicon based liquid elastomeric sealant, non solvent release type, mildew resistant. Low VOC sealants shall be used on all LEED projects.

H. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride: light gray, self-adhesive or prepared for either adhesive application or mechanical anchorage.

I. Paints and Coatings:

1. Provide the types of painting and coating materials which after drying or curing are durable, non toxic, non dusting, non flaking and mildew resistant.

2. Primer coating for metal: Type suitable for baking where indicated.

3. Enamel for metal: Synthetic type suitable for baking where indicated.

4. Sound deadening: Heavy-bodied resinous coating, filled with granulated cork or other resilient material, compounded for permanent, non flaking adhesion to metal in a 1/8 inch thick coating.

2.03 FABRICATION OF METALWORK

A. Gauges, where specified, shall be United States standard gauges. Finish exposed surfaces to #4 or 180 grit. Where manufacturing process and welding disturb original finish, carefully re-grind, polish, and restore to match balance of surface.

B. General Fabrication Requirements: Remove burrs from sheared edges of metalwork, ease the corners, and smooth to eliminate cutting hazard. Bend sheets of metal at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces without damage to finish.

C. Reinforce metal at locations of hardware, anchorages and accessory attachments, wherever metal is less than fourteen (14) gauge or requires mortised application. Conceal reinforcements to the greatest extent possible. Weld in place on concealed faces.

D. Where fasteners are permitted, provide Phillips head flat or oval head machine screws.

E. Work-surface fabrication: Fabricate metal work surfaces by forming and providing seamless construction, using welding rod matching sheet metal. Where necessary for disassembly, provide waterproof gasket draw-type joints with concealed bolting.

F. Reinforce work surfaces 30 inches o.c. both ways with galvanized or stainless concealed structural members. Reinforce edges which are not self-reinforced by formed edges.

G. Sound deaden underside of metal work surfaces, including sinks and similar units, with a coating of sound deadening material. Hold coating back 3 inches from sanitary edges which are open for cleaning.

H. Structural framing: Except as otherwise indicated, provide framing of minimum 1 inch pipe size round pipe or tube members, with mitered and welded joints and gusset plates ground smooth. Provide 14 gauge stainless steel tube for exposed framing and galvanized steel pipe for concealed framing.

I. Enclosure General: Provide enclosures, including panels housing, and skirt for service lines and mechanical/electrical devices and secondary enclosures for equipment items where indicated and where required for compliance with governing regulations and NSF standards. Otherwise, fabricate each item to be as open as possible for ease of cleaning. Where equipment is exposed to view, provide enclosure of service lines operating components and mechanical and electrical devices.

J. Welding:

1. Stainless Steel Welds: Use stainless steel electrodes. Finish welds free of pits, flaws, discoloration, and peen to remove flux and impurities. Grind welds smooth, polish to original finish of metal, with grain uniform to grain of original sheet. Where grinding and/or polishing has destroyed grain, restore blend to omit traces of welding.

2. Solder containing lead as an intentional ingredient shall not be used in a food zone or splash zone (NSF 4.2/ ANSI 2-2010).

3. Grind concealed or exposed welds on unpolished surfaces back to original surface metal to remove impurities from welds. Make welds smooth, with neither dip nor bulge.

K. Electrical Components:

1. Fit fabricated items requiring dry heat with tube heaters of sufficient wattage to provide desired heat. Unless otherwise specified, install heaters directly below bottom shelf, mounted in suitable channels and interconnect with fire resistive covered nickel wire in accordance with State Electrical Codes. Furnish each fixture with one (1) or more thermostatic control, with pilot light indicator.

2. Wiring shall be properly protected in metal enclosures as called for by State Electrical Code and Underwriters Laboratory

3. Exposed electrical outlet boxes on fabricated equipment shall be stainless steel and shall be supplied and mounted by the Food Service Equipment Subcontractor ready for wiring by Electrical Subcontractor.

4. Internal wiring for fabricated equipment items, including electrical devices built into or forming an integral part of these items shall be furnished and installed by the Food Service Equipment Subcontractor in his factory with items wired complete to a junction box within the fixture ready for final connection to building lines by Electrical Subcontractor. Receptacles shall be grounding type listed by Underwriters Laboratories and approved for use by the National Electrical Code. Each single item of fabrication shall be wired to the minimum number of junction boxes possible for that piece of equipment.

5. Unless otherwise specified, furnish cord-connected items with cord sets not exceeding 6 feet in length. Cord sets shall contain an equipment grounding conductor and shall be furnished with caps or plugs listed or recognized by Underwriters Laboratories, Inc. Cords shall be listed by Underwriters Laboratories, Inc.

L. Pipestands and Frames:

1. Construct pipestands for open base tables or dish tables of 1-5/8 inch 16 gauge stainless steel. Construct stringers and cross braces of same material. Weld joints between legs and cross braces and grind to a smooth finish.

2. Cross rails supplied to reinforce each leg. Legs anchored to closed gussets at top only and without cross rails are not acceptable except in case of sinks. Fit uprights at top with die-stamped fully enclosed gussets stud-bolted to underside of top with cadmium-plated lock nuts. Where stainless steel base is called for, stainless steel gussets will be used.

M. Feet:

1. Fit pipe legs with sanitary die- stamped stainless steel bullet shaped feet, fully enclosed with slightly rounded bottom to protect floor. These shall have a total adjustment of 1 inch with thread unexposed.

2. Mount cabinet type fixtures on 6 inch die-stamped sanitary one-piece stainless steel feet, capable of an adjustment of 1 inch with thread unexposed.

N. Table Tops (metal):

1. Metal table tops shall be of 14 gauge stainless steel. Shop seams and corners shall be welded, ground smooth and polished. Brace tops with 1 inch by 1 inch by 4 inch galvanized channel running length of table. Cross angles shall be furnished at intermediate legs. Bracing shall be stud bolted to underside of top with cadmium plated lock nuts. Sound deadening mastic shall break metal-to-metal contact between angle bracing and underside of top.

2. Provide field joints in top where necessary. Locate field joints for practical construction and consistent in size, convenient for shipping and accessibility into building.

3. Metal top edges shall be turned down 1-3/4 inch in a bullnosed roll except where otherwise called for in Itemized Specifications and/or Fabrication Drawings/Details.

O. Dish Table Tops:

1. Construct tops of dish tables from 14 gauge stainless steel with free edges turned up 3 inches and finished with die-formed sanitary rolled rim. Sides adjacent to walls or higher fixtures flanged up 10 inches and back 1-1/2 inches at 45 degree angle and vertically down one inch, except where otherwise called for in Itemized Specification and/or Fabrication Drawings/Details. Interior horizontal and vertical corners shall be coved on 5/8 inch radius. Outside radius of rolled rim corners concentric with inside cove brace with 1-1/2 inch by 1-1/2 inch by 1/8 inch stainless steel angle front-to-back on approximately 24 inch centers. Bracing shall be stud-bolted to underside of top with cadmium plated lock nuts. Sound deadening mastic shall break metal-to metal contact between angle bracing and underside of top.

2. Mount dish table tops on tubing legs and connecting rails.

3. Provide full-length splashes with closed ends.

P. Cabinet Bases:

1. Enclosed bases or cabinet bodies shall be of 18 gauge stainless steel or as called for in Itemized Specifications. Body shall be enclosed on front and ends, with body corners square. Ends shall terminate at operators side in a 2 inch wide vertical mullion. Mullion shall be in accordance with NSF requirements. Body shall be braced at top with 1-1/2 inch by 1-1/2 inch by 1/8 inch stainless steel angle frame work with angles spaced on approximately 24 inch centers. Body shall be mounted on 6 inch high stainless steel

bullet counter legs, welded to 12 gauge gussets, which in turn shall be welded to the body.

2. In the case of fixtures fitting against or between the walls, the bodies shall be set in 1 inch from the wall line, but tops will extend back to wall line. This will permit adjustment to wall irregularities. A vertical trim strip of the same material as body shall be provided and installed at ends or rear of fixture to close gap between body and wall.

Q. Elevated Cabinets: Top shall be constructed of 20 gauge material or as called for in Itemized Specifications with edges turned down 1-1/2 inches from rear to front. Twenty (20) gauge body shall be enclosed on back and ends with bottom and intermediate shelves. Ends shall terminate at front in a 2 inch mullion. Mullion shall be open in accordance with NSF. Intermediate stationary shelf shall be welded to body. Back shall be fitted with channels for supporting cabinet to wall. Shelves shall be 18 gauge stainless steel.

R. Sliding Doors: Doors shall be double wall constructed with exterior and interior of 18 gauge stainless steel, fitted at top with steel ball bearing roller, operating in die-formed overhead track of same material as door exterior. Guide pins shall be located on bottom shelf at center of opening. Doors shall be fitted with die stamped, stainless steel recessed handles and a stainless steel channel for guiding door at bottom.

S. Hinged Doors: Doors shall be double pan-shaped with exterior and interior of 18 gauge stainless steel. Hinged doors, flush type, shall be mounted on concealed stainless steel slip joint hinges. Doors shall have integral, flush handles and shall be fitted with magnetic catches.

T. Drawers: Drawer bodies shall be die-stamped pans, sizes and material as called for in Itemized Specifications and/or Fabrication Drawings/Details with horizontal and vertical corners generously coved. Drawer bodies or pans shall rest in and shall be removable from cradle. Cradle shall be welded to die-stamped drawer face of 16 gauge stainless steel. Drawer face shall be furnished with die-stamped integral handle. Cradle shall be furnished with ball bearing steel rollers and stops. Drawer housing shall be complete with ball bearing steel rollers and built-in self-closing track to accommodate rollers on cradle.

U. Undershelves for Open Bases: Undershelves on open base tables shall be solid, of 16 gauge stainless steel.

V. Interior Shelves for Cabinet Bases: Interior shelves in cabinet bodies and enclosed bases shall be solid, of 16 gauge stainless steel with set-back construction. Provide non-removable shelves with ends and backs turned up 1-1/2 inches against body of fixture, and welded to same. Front edge shall be further braced with longitudinal centered 1-1/2 inch by 1-1/2 inch by 1/8 inch angles.

W. Pipe Chases:

1. Where top arrangement of enclosed base table make it necessary for plumbing and supply piping to be passed through base, this piping shall be enclosed in suitable pipe chase with easily removable access panels. These access panels are not to be held in place with screws or latches, but formed up in a pan shape, removable with out tools.

2. In detailing fixtures, the Food Service Equipment Subcontractor shall consult with the Mechanical and Electrical Subcontractor to be certain that due allowance is made for traps or other controls and fittings.

3. Where plumbing and supplying piping pass through shelves on open base tables, shelves neatly punched or die-stamped for piping, the Food Service Equipment Subcontractor shall note location of such pipe chases or stamped pipe openings on his plan and/or detail drawings. Unless otherwise specified, shelves in these fixtures shall be turned up a minimum of 3 inches at edge of pipe chase. These shall be of sufficient size to accommodate necessary risers, so that additional holes need not be cut. The Food Service Equipment Subcontractor shall caution the Mechanical Subcontractor to rough-in as near to these chases as possible, so risers from rough-in to final connection run through existing chases and/or slots.

X. Elevated Shelves: Elevated shelves shall be constructed of 16 gauge stainless steel, unless otherwise called for with edges and brackets per Fabrication Details. Shelves shall be mounted on solid stainless steel gusset type wall brackets. If table mounted, supports shall be stainless steel tubing of size and gauge called for in Fabrication Details and mounted in accordance with one of the following:

1. Supports mounted to flat surface (metal), without undercounter restrictions, shall be bolted through top with 3/4 inch stainless steel bolt into steel bushings wedged into tubing or welded into flange welded to table top as called for in Fabrication Details.

2. Supports mounted to flat surface (maple or composition) shall be surface mounted with raised ferrules and set screws.

3. Supports mounted to rolled rim shall be contoured to match roll and mounted with raised ferrules and set screws.

4. Supports mounted to table riser, use stainless steel saddle brackets mounted to riser or mounted through riser to angle bracket and welded to riser and bracket as called for in Fabrication Details.

Y. Sinks:

1. Sinks shall be of size called for and constructed of 14 gauge stainless steel with backs, bottoms, and front formed of one continuous sheet with ends welded in place.

2. Horizontal edges and vertical corners of sink shall be coved on 3/4 inch radius. Two and three compartment sinks shall have double wall partitions of same material as sink. Intersections between partitions and sink body shall be coved on 3/4 inch radius, all welded construction.

3. Bottom of each compartment shall have six (6) radial grooves pitched to drain depression. Sinks shall have 2 inch basket lever-wastes unless otherwise specified.

4. Front and end edges of sink shall be finished with 1-1/2 inch diameter semi-roll with rounded corners, with entire roll terminating against rear splash and fully welded and polished. Back turned up 6 inches at work table w/ sinks and 12” at pot sinks with 1-1/2

inch turn back at top and ends on 45 degree angle and vertically down 1 inch, except where otherwise called for in Itemized Specification and/or Fabrication Drawings/Details. Ends of splash shall be closed.

5. Equip drawers, cabinets, and doors with tumbler locks and keys.

Z. Casters:

1. Where called for in Itemized Specifications, provide heavy-duty, neoprene ball bearing swivel casters.

2. Unless otherwise specified, casters shall have foot-activated locking brakes.

2.04 FIELD QUALITY CONTROL

A. The Owner, Architect or their duly authorized representative shall have free access to Food Service Equipment Subcontractor's shop or shops during the construction of this equipment for the purpose of making inspections to see that plans, specifications, and detail drawings are being adhered to carefully. The Food Service Equipment Subcontractor shall correct errors found during these inspections to the extent and within scope of plans, specifications and detail drawings.

B. Material delivered to site may be inspected by Owner, Architect or their authorized representative. The Food Service Equipment Subcontractor shall within a reasonable time after receiving written notice from Architect to that effect, proceed to remove from grounds or building materials, fixtures or apparatus condemned by Architect or take down and remove portions of work which Architect deems as failing to conform to drawings and specifications and to conditions of the contract.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

A. Rough-in-work: Require Installer of food service equipment to examine roughed-in mechanical and electrical services and installation of floors, walls, columns and ceilings, and conditions under which the work is to be installed; and to verify dimensions of services and substrates before fabricating and installing the work. Notify the Food Service Equipment Subcontractor in writing of unsatisfactory conditions for proper installation of food service equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION

A. Service Lines and Equipment Connections: Comply with applicable requirements of Division-22 for piping connections and piping systems. Comply with applicable requirements of Division-26 Sections for electrical work including equipment connections.

B. Set each item of non mobile and non portable equipment securely in place, leveled and adjusted to correct height. Anchor to supporting substrate where indicted and where required for sustained operation and use without shifting or dislocation.

C. Conceal anchorages where possible. Adjust counter tops and other work surfaces to a level tolerance of .0625 inch maximum offset, and maximum variation from level or indicated slope of .0625 inch per foot.

D. Complete field assembly joints in the work (joints which cannot be complete in shop) by welding, bolting and gasketing, or similar methods as indicated. Grind welds, smooth and restore finish. Set or trim gaskets flush, except for "T" gaskets as indicated.

E. Treat enclosed spaces inaccessible after equipment installation by covering horizontal surfaces with powdered borax at a rate of four ounces per square foot.

F. Install closure plates and strips where required, with joints coordinated with units of equipment. Make joints airtight, waterproof, vermin-proof and sanitary for cleaning purposes. In general, make sealed joints not less than .125 inch at .25 inch depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint. At internal corner joints, apply sealant or gaskets to form a sealant-filled or gasket joints up to .50 inch joint width; metal closure strips for wider joints, with sealant application each side of strips. Anchor gaskets mechanically or with adhesives to prevent displacement.

3.03 CLEANING AND RESTORING FINISHES

A. After completion of installation, and completion of other major work in food service areas, remove protective coverings, and clean food service equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.04 TESTING, START-UP AND INSTRUCTIONS

A. General: Execute the start-up of food service equipment after service lines have been tested, balanced and adjusted for pressure, voltage and similar considerations; and after water and steam lines have been cleaned and treated for sanitation.

B. Test each item of operational equipment to demonstrate that it is operating properly and that controls and safety devices are functioning. Repair or replace equipment which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

C. Instruct Owner's operating personnel in proper operation and maintenance procedures for each item of operational food service equipment.

D. Final Cleaning: After testing and start-up, and before the time of substantial completion, clean and sanitize food service equipment, and leave in condition ready for use in food service.

3.05 ITEMIZED SPECIFICATION

ITEM # E01 WORK TABLE W/SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. One (1) T&S Brass Model B-0220-LN Mixing Faucet, deck mount, 8" centers with 1/2" IPS eccentric flanged female inlets, lever handles
3. One (1) T&S Brass Model 061X Swing Nozzle, 10" (deduct cost of standard nozzle)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 12" deep utility sink.
6. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

ITEM # E01A OVERSHELF/UTENSIL/POT RACK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
3. Coordinate installation with Item No. E01 - Work Table w/Sink.

ITEM # E02 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

ITEM # E03 PREP TABLE W/SINKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:

2. One (1) T&S Brass Model B-0220-LN Mixing Faucet, deck mount, 8" centers with 1/2" IPS eccentric flanged female inlets, lever handles
3. One (1) T&S Brass Model 061X Swing Nozzle, 10" (deduct cost of standard nozzle)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with two (2) 21" x 21" x 12" deep utility sinks.
6. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

ITEM # E04 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. One (1) (3) years parts & labor warranty from date of installation (standard)
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) 115v/60/1-ph, 17.4 amps
5. One (1) Model SYPHON STD Syphon breaker standard, 1/2" (11477)
6. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)
7. Coordinate installation with Item No. E03 - Prep Table w/Sinks.

ITEM # E05 WALL SHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Unit shall be mounted at 60" A.F.F.
3. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
4. Coordinate wall blocking by the General Contractor

ITEM # E06 COMBI OVEN

Quantity: One (1)
Manufacturer: Eloma

Model: GENIUS MT 10-11G

1. GeniusMT Combi Oven/Steamer, gas, boilerless, countertop, (10) 18" x 26" full size sheet pan capacity, auto-clean, steam, convection, multiTouch display, (4) start screens, (9) program operations, HACCP data stored, temperature probe, includes (5) wire racks, (1) 10 liter cleaner & (1) 10 liter rinse aid, spray hose, type 304 stainless steel interior & exterior, ETL, cETLus, 68,000 BTU
2. One (1) Standard warranty: 12 months parts & labor
3. One (1) Natural Gas
4. One (1) Controls: 120v/50/60/1-ph, 1.0 kW, 15.0 amps, standard
5. One (1) Door hinged on right only for gas ovens, standard
6. One (1) Model E0506916 Support Stand, 22.44" for single 6-11 or 10-11 electric and gas models, holds 6 sheet pans
7. One (1) NOTE: Cannot be used with 'Stacked Mounting options'
8. One (1) Model E000255-SET Casters, swivel 5" with brake, set of four
9. One (1) NOTE: Cannot be used with 'Stacked Mounting options'
10. One (1) Model E900905 BWT BestProtect V H20 Filter System Complete, for single MultimaxB/Genius MT 611 & 1011 Ovens, single or double stacked Genius MTC 1-1 compact (2 required for stacked compacts), includes: filter head, aquameter 3/8" with LCD display, bestflush, fitting, intake hose, single V cartridge
11. Provide mounting bracket for water filter. Coordinate dimensions with water filter.
12. One (1) NOTE: Eloma does not warranty these items, must follow manufacturer's installation instructions, warranty is per manufacturer's written warranty
13. One (1) Model E900935 BWT BestProtect V Replacement Cartridge, 2 pk
14. One (1) Model E729221 Oven cleaner, Multi-Clean, 10 liter container, each
15. One (1) Model E729248 Rinse aid, Multi-Clean, 10 liter container, each
16. One (1) Model E000013 Chemical holder, (2) 10L container capacity, with tabs for wall mounting
17. One (1) NOTE: Cannot be used with 'Stacked Mounting options'

ITEM # E07 WALL SHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Unit shall be mounted at 60" A.F.F.
3. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
4. Coordinate wall blocking by the General Contractor

ITEM # E08 WALL SHELF

Quantity: One (1)
Manufacturer: Fabricator

Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Unit shall be mounted at 60" A.F.F.
3. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
4. Coordinate wall blocking by the General Contractor

ITEM # E09 DRY STORAGE SHELVING

Quantity: Four (4)
Manufacturer: Metro
Model: 2448NK3

1. Four (4) Model 2448NK3 Super Erecta® Shelf, wire, 48"W x 24"D, plastic split sleeves are included in each carton, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
2. Four (4) Model 74UPK3 Super Erecta® SiteSelect™ Post, 73-7/8"H, for use with stem casters, Metroseal 3 epoxy coated corrosion-resistant finish with Microban® antimicrobial protection
3. Four (4) Model 5MB Super Erecta® Stem Caster, brake (foot operated), 5" diameter, 1-1/4" face, flat resilient wheel tread, with donut bumpers, 200 lb. capacity, brakes are foot operated

ITEM # E10 3-BAY POT SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Two (2) T&S Brass Model B-0291 Kettle & Pot Sink Faucet, Big-Flo, wall mounted 8" centers, 3/4" IPS model LL street EL inlets with locknuts, 18" swing nozzle, 175°F four arm handles, 1-1/4" diameter holes required in backsplash
3. Three (3) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
4. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

ITEM # E11 WALL SHELF W/POT HOOKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Unit shall be mounted at 72" A.F.F.
3. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
4. Coordinate wall blocking by the General Contractor

ITEM # E12 MOBILE POT SHELVING

Quantity: Four (4)
Manufacturer: Metro
Model: MQ2460G

1. MetroMax Q™ Shelf, 60"W x 24"D, open grid polymer with Microban® antimicrobial product protection, epoxy coat steel frame, (4) wedge connectors, NSF
2. Four (4) Model MX74UP Polymer trilobal post (compatible with MetroMax i, MetroMax 4, MetroMax Q), 73-3/16"H, for use with stem casters, adjusts at 1" increments, corrosion proof all polymer construction with built in Microban® antimicrobial product protection
3. Four (4) Model 5MBX Stem Caster, brake, 5" diameter, 1-1/4" wide face, resilient wheel tread, 200 lb. capacity, NSF (donut bumpers included) (for use with all MetroMax posts & shelves)

ITEM # E13 WALL SHELF W/POT HOOKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Unit shall be mounted at 72" A.F.F.
3. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.
4. Coordinate wall blocking by the General Contractor

ITEM # E14 WORK TABLE W/SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. One (1) T&S Brass Model B-0220-LN Mixing Faucet, deck mount, 8" centers with 1/2" IPS eccentric flanged female inlets, lever handles
3. One (1) T&S Brass Model 061X Swing Nozzle, 10" (deduct cost of standard nozzle)

4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 12" deep utility sink.
6. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

ITEM # E15 REACH-IN FREEZER

Quantity: One (1)
Manufacturer: EXISTING TO BE RELOCATED

1. Verify and coordinate all details, dimensions and utility requirements in the field with the GC.

ITEM # E16 ICE MACHINE W/BIN & WATER FILTER

Quantity: One (1)
Manufacturer: EXISTING TO BE RELOCATED

1. Verify and coordinate all details, dimensions and utility requirements in the field with the GC.

ITEM # E17 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-67

1. One (1) Model 7-PS-67 Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, with splash mounted faucet, lever drain (no overflow), wall bracket, NSF, cCSAus
2. One (1) Note: This faucet complies with 2014 Federal no lead standards
3. One (1) Model K-316-LUHA Wrist Handles Only, for splash or deck mount hand sink faucet (1 pair hot & cold 4" long blades), fits faucets supplied after November 2015 with hot & cold color rings that do not have exposed screw head
4. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
5. One (1) Model 7-PS-15 Welded Side Splash, 12"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # E18 COFFEE BREWER

Quantity: One (1)
Manufacturer: EXISTING TO BE RELOCATED

Model: EXISTING

1. Verify and coordinate all details, dimensions and utility requirements in the field with the GC.

ITEM # E19 POT SHELVING

Quantity: One (1)
Manufacturer: EXISTING TO BE RELOCATED
Model: EXISTING

1. Verify and coordinate all details and dimensions in the field with the GC.

ITEM # E20 FLOOR MIXER

Quantity: One (1)
Manufacturer: EXISTING
Model: EXISTING

1. Verify and coordinate all details, dimensions and utility requirements in the field with the GC.

ITEM # E21 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per custom fabrication shop drawings and the following:
2. Foodservice Equipment Subcontractor shall verify and coordinate the fabrication with regard to delivery and access into building.

END OF SECTION 114000

SECTION 220001

PLUMBING

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PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Domestic cold water system to each and every fixture and piece of equipment requiring domestic cold water.
2. Domestic hot water and hot water return system to each and every fixture and piece of equipment requiring domestic hot water.
3. Sanitary waste and vent system connecting to each and every fixture and piece of equipment requiring sanitary drainage.
4. Alterations, additions, and/or removal of existing plumbing systems and fixtures within the renovated area in order to conform to new space requirements.
5. Valves.
6. Hoisting equipment for the Work of this Section.
7. Core drilling and material removal.
8. Coordination with General Contractor for use of staging, planking and scaffolding, interior and exterior, which is the responsibility of the General Contractor as specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

B. Alternates: Not Applicable.

C. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.

D. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.

E. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in

accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

1.3 SUBMITTALS

A. Comply with requirements specified in Section 013300 – SUBMITTAL REQUIREMENTS.

B. Material and equipment requiring Shop Drawing Submittals shall include but not be limited to:

1. Plumbing fixtures and trim.
2. Piping.
3. Fittings, unions, flanges, and couplings.
4. Insulation.
5. Valves.
6. No-hub couplings.

1.4 DEFINITIONS

A. As used in this Section, "provide" means "furnish and install" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."

1.5 CONTRACT DOCUMENTS

A. Listing of Drawings does not limit responsibility of determining full extent of work required by Contract Documents. Refer to Architectural, HVAC, Plumbing, Fire Protection, Electrical, Structural, and other Drawings and other Sections that indicate types of construction in which work shall be installed and work of other trades with which work of this Section must be coordinated.

B. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.

C. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.

D. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.

E. Information and components shown on riser diagrams but not shown on plans, and vice versa, shall apply or be provided as if expressly required on both.

F. Data that may be furnished electronically by the Designer (on computer tape, diskette, or otherwise) is diagrammatic. Such electronically furnished information is subject to the same limitation of precision as heretofore described. If furnished, such data is for convenience and generalized reference, and shall not substitute for Designer's sealed or stamped construction documents.

1.6 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities thus resolved.

B. Where Drawings or Specifications do not coincide with manufacturers' recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.

C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.

D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with the paragraph above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.

E. In cases covered by the paragraph above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

1.7 MODIFICATIONS IN LAYOUT

A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.

B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.

C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.

D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.

E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

1.8 SITE VISIT

A. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observer.

1.9 EXISTING CONDITIONS AND PREPARATORY WORK

A. Before starting work in a particular area of the project, visit site and examine conditions under which work must be performed including preparatory work done under other Sections or Contracts or by User Agency. Report conditions that might affect work adversely in writing through Contractor to Designer. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.

1.10 CODES, STANDARDS, AUTHORITIES AND PERMITS

A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have legal jurisdiction over the site. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:

1. Local and state building, plumbing, mechanical, electrical, fire and health department codes.
2. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
3. Occupational Safety and Health Act (OSHA).
4. Factory Mutual Association (FM) if applicable to project.
5. Underwriters' Laboratories (UL).
6. American National Standards Institute (ANSI).

B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME and AGA for intended service.

C. When requirements cited in this Specification conflict with each other or with Contract Documents, most stringent shall govern work. Designer may relax this requirement when such relaxation does not violate ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.

D. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:

1. American National Standards Institute (ANSI).
2. American Society of Mechanical Engineers (ASME).
3. National Electric Manufacturers Association (NEMA).
4. American Society for Testing and Materials (ASTM).
5. American Water Works Association (AWWA).
6. Thermal Insulation Manufacturers Association (TIMA).
7. Institute of Electrical and Electronics Engineers (IEEE).
8. Insulated Cable Engineers Association (ICEA).
9. National Fire Protection Association (NFPA).

1.11 GUARANTEE AND 24-HOUR SERVICE

A. Guarantee Work of this Section in writing for one year following the date of Substantial Completion. If the equipment is used for ventilation, temporary heat, etc. prior to Substantial Completion, the bid price shall include an extended period of warranty covering the one-year of occupancy, starting from the initial date of Substantial Completion. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Designer's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

B. In addition to guarantee requirements of Division 01 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in User Agency's name.

C. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Designer.

D. Provide 24 hour service beginning on the date the project is first occupied for public use by the User Agency, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to DCAMM. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Designer and DCAMM’s Project Manager approval. Submit name and a phone number that will be answered on a 24-hour basis each day of the week, for the duration of the service.

E. Submit copies of equipment and material warranties to Designer before final payment.

F. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to User Agency.

G. This Paragraph shall not be interpreted to limit DCAMM’s Project Manager's rights under applicable codes and laws and under this Contract.

H. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph.

I. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work nor beneficial use by User Agency, and shall not institute guarantee period.

J. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to DCAMM's Project Manager's satisfaction, advise Designer in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Designer will suggest course of action.

1.12 RECORD DRAWINGS

A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT.

B. All "main air" pneumatic control piping routing locations must be shown on the record drawings.

C. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.13 BULLETINS, MANUALS, AND OPERATING INSTRUCTIONS, AND PROTECTION

A. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field-assembled units, including as built wiring diagrams. Manual shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:

1. Directions for and sequence of operation of each item of Plumbing systems. Sequence shall list valves, switches, and other devices used to start, stop and control system. Include approved valve directory showing each valve number, location of each valve, and equipment or fixture controlled by valve.
2. Detailed maintenance and trouble shooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.
3. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.

B. Furnish three copies of manuals to Designer for approval and distribution to DCAMM's Project Manager. Deliver manuals no less than 30 days prior to acceptance of equipment to permit User Agency's personnel to become familiar with equipment and operation prior to acceptance.

C. Provide framed and glazed charts as follows: mount as directed by Designer.

1. Flow diagrams from first part of manual as described above.
2. Valve directory.
3. Lubrication chart from third part of manual.

D. Operating instructions: Upon completion of installation or when DCAMM's Project Manager accepts portions of building and equipment for operational use, instruct User Agency's operating personnel in any or all parts of various systems. Instructions shall be performed by factory trained personnel. User Agency shall determine which systems require additional instructions. Duration of instructions shall take equipment through complete cycle of operation (at least five working days). Make adjustments under operating conditions.

E. Each contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.

F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.14 COORDINATION DRAWINGS

A. Refer to Section 013100 – PROJECT MANAGEMENT AND COORDINATION for coordination drawing requirements.

B. Coordination Drawings include but are not necessarily limited to:

1. Structure.
2. Partition/room layout.
3. Ceiling tile and grid.
4. Light fixtures.
5. Access panels.
6. Sheet metal, heating coils, boxes, grilles, diffusers, etc.
7. All heating piping and valves.
8. Smoke and fire dampers.
9. Soil, waste and vent piping.
10. Major water and medical gases.
11. Roof drain piping.
12. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.
13. Above ceiling miscellaneous metal.
14. Sprinkler piping and heads.

PART 2 - PRODUCTS

2.1 PIPING, FITTINGS AND JOINTS

A. General:

1. Pipe and fittings shall conform to the latest ANSI, ASTM, NFPA and AWWA Standards including latest amendments.
2. Each length of pipe, each pipe fitting, trap, material and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.
3. Piping and fittings shall be factory coated.
4. Pro-press type piping and fittings may be used, but shall be limited to domestic water lines, 2 inches or less in diameter.

B. Sanitary Drainage Piping Above Floor (Soil, Waste, and Vent)

1. Piping 2 in. and larger shall be no-hub service weight cast iron soil pipe except at urinals and cleanouts and joints just prior to exiting the building which shall be service weight hub and spigot with lead and oakum joints.
2. Piping 12 in. and smaller shall be type “L” copper.
   a. In lieu of soldered joints for 2 in. through 8 in. type “L” copper tubing systems, Victaulic or approved equal by Grinnell or Anvil Gruvlok grooved joint couplings and fittings may be used. Fittings shall be ASME B16.22 wrought copper or ASME B16.18 bronze casting with copper tubing sized grooved ends (flaring of tube and fitting ends to IPS dimensions is not permitted).
   b. Couplings shall consist of two ductile iron housings cast with offsetting, angle-pattern bolt pads coated with copper-colored enamel, pressure-responsive, synthetic rubber gasket (Grade “T” Nitrile), and plated steel bolts and nuts. Victaulic Style 607 or approved equal by Grinnell or Anvil Gruvlok.
3. Couplings for joining no-hub cast iron soil pipe: Couplings shall have a shield constructed of corrugated 304 stainless steel and provide a shield thickness of 0.16 inches or greater. Shield shall be a minimum width of 3 inches for pipe sizes 1-1/2 inch through 4 inch, and a minimum width of 4 inches for pipe sizes 5 inch through 10 inches. Couplings with at least 4 sealing bands shall require 80 inch pounds of torque per band. Tightening screws shall be 3/8 inch hexagon head. Couplings with only 2 sealing bands on sizes 1-1/2 inch through 4 inches shall require 125 inch pound of torque per band. Gaskets shall be neoprene rubber conforming to ASTM C-564.
4. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fitting and lead free solder and non corrosive flux.
5. Connections between earthenware of any fixture and flanges in soil and waste piping shall be made absolutely gas and watertight with closet setting compounds and gaskets which must be absolutely gas and fireproof, watertight, stainproof, containing neither oil nor asphaltum and which will not rot, harden or dry under any extreme climatic change, and must adhere on wet surfaces.

C. Water Piping (Domestic, Non-Potable and Tempered)

1. Above Ground
   a. 1-1/2 inches and smaller shall be hard drawn Type L copper with push-to- connect fittings. Fittings shall be ASME B16.18 cast copper alloy or ASME B16.22 wrought copper with stainless steel teeth and EPDM synthetic rubber o-ring seal in each end (UL classified in accordance with NSF-61 for hot (+180°F) and cold (+86°F) potable water service) with push-to-connect ends instead of solder-joint ends.
   b. 2-1/2 inches and smaller shall be hard drawn Type L copper with wrought or cast copper fittings.
   c. 2 inches and larger may be hard drawn Type L copper with Victaulic or approved equal by Grinnell or Anvil Gruvlok roll grooved mechanical couplings.
      1) Victaulic or approved equal by Grinnell or Anvil Gruvlok grooved end fittings shall be ASME B16.22 wrought copper or ASME B16.18 bronze castings with copper tubing sized grooved ends (flaring of tube and fitting ends to IPS dimensions is not permitted).
      2) Couplings shall be "Installation Ready" stab-on design for direct "stab" installation onto roll grooved copper tube without prior field disassembly and no loose parts. Coupling shall consist of two ductile iron housings cast with offsetting, angle-pattern bolt pads coated with copper-colored enamel, pressure-responsive, synthetic rubber gasket (Grade "EHP" EPDM), and plated steel bolts and nuts. Victaulic Style 607 QuickVic or approved equal by Grinnell or Anvil Gruvlok.
      3) Flange adapters shall be copper tube dimensioned, ductile iron casting coated with copper-colored enamel, flat face, designed for direct connection to ANSI Class 125 and 150 flanged components. Victaulic Style 641 or approved equal by Grinnell or Anvil Gruvlok.
   d. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fitting and lead free solder and non corrosive flux.
   e. Provide galvanized malleable iron unions, with bronze facings conforming to ANSI B16.39 for sizes 2 inch and smaller.
   f. Provide steel flanges conforming to ANSI B16.5, standard or welding neck pattern.

D. Unions and Flanges

1. Unless otherwise specified herein, unions for copper and brass piping two inches and smaller in diameter shall be 125 SWP, bronze body brass ground joint type. Those larger than two inches in diameter shall be 150 SWP flat faced cast brass flanges conforming to ANSI Standard B16.24.
2. Where brass flanges and ferrous flanges are to be joined, ferrous flanges shall be full faced.
3. Mating of ferrous and non ferrous flanges shall be separated with rubber gaskets (1/16 inch minimum thickness) and Teflon liners installed in the bolt holes. Bolt holes shall be drilled to receive the Teflon lines. Physical contact between the ferrous and non ferrous flanges including the bolts, nuts and washers will not be permitted.
4. Unions for ferrous piping shall be of the same material as the piping to which they connect.
5. On grooved piping systems, the couplings shall act as the union
6. Grooved flange adapter Victaulic Style 641 or approved equal by Grinnell or Anvil Gruvlok for direct connection to CL 150 flanged components.

2.2 VALVES AND SUNDRIES

A. General

1. Manufacturer: Subject to compliance with requirements, provide products from one of the manufacturers listed.
2. Valve Design: Rising stem or rising outside screw and yoke stems.
3. Nonrising stem valves may be used where headroom prevents full extension of rising stems.
4. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.
5. Sizes: Same size as upstream pipe, unless otherwise indicated.
6. Operators: Provide the following special operator features:
    a. Handwheels, fastened to valve stem, for valves other than quarter turn.
    b. Lever handles, on quarter turn valves 6 inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
    c. Chain-wheel operators, for valves 2-1/2 inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5 ft.-0 in. above finished floor elevation.
    d. Gear drive operators, on quarter turn valves 8 inch and larger.
    e. Power actuators, on grooved end valves 2 inch and larger with electrical, hydraulic, or pneumatic activation.
7. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
8. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
9. End Connections: As indicated in the valve specifications.
    a. Threads: Comply with ANSI B1.20.1.
    b. Flanges: Comply with ANSI B15.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
    c. Grooved: Comply with ANSI/AWWA C606.
    d. Solder-Joint: Comply with ANSI B16.18.
        1) Caution: Where soldered end connections are used, use solder having a melting point below 840 deg. F for gate, globe, and check valves; below 421 deg F for ball valves.

B. Valves in the interior domestic water piping systems (cold water, hot water) and gas system:

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
    a. Apollo.
    b. Nibco.
    c. Victaulic.
    d. Watts.
2. Ball Valves
    a. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable

"Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold water service.

b. Ball Valves, 1-1/4 Inch and Smaller: Rated for 200 psi cold water pressure, two-piece construction; with forged brass body, full port, chrome-plated brass ball and brass stem, PTFE seat ring and packing, lever handle, push-to-connect ends for domestic hot and cold water service. Victaulic PermaLynx 300 Series or approved equal.

c. Ball Valves, 1-1/4 Inch to 2 Inch: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; 3 piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold water service.

3. Butterfly Valves

a. Butterfly Valves, 2-1/2 Inch and Larger: MSS SP-67; rated at 200 psi; cast iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead end service or requiring additional body strength.

b. Butterfly Valves, 2-1/2 Inch and Larger: Meets or exceeds the requirements of MSS SP-67, rated at 300 psi; bronze body with copper tubing sized grooved ends designed for installation with Victaulic or approved equal couplings. EPDM coated ductile iron disc and integrally cast steel stem, lever handle, gear operator with handwheel, or power actuator. Victaulic Series 608 or approved equal .

4. Check Valves

a. In-Line, Lift-Type Check Valves, 1-1/2 Inch and Smaller: Suitable for installation in horizontal or vertical lines with upward flow, bronze body, stainless steel stem and spring, TFE disc with stainless steel disc holder, push-to-connect ends. Victaulic PermaLynx 510 Series or approved equal.

b. Swing Check Valves, 2 Inch and Smaller: MSS SP-80; Class 125, cast bronze body and cap conforming to ASTM B 62; with horizontal swing, Y pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

c. Swing Check Valves, 2-1/2 Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection ping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

C. Sundries

1. Acceptable Manufacturers: Chicago Faucet, T & S Brass and Bronze Works, Inc., Speakman Co., Josam Manufacturing, Jay R. Smith, Zurn Manufacturing, Precision Plumbing Products or approved equal.

2. Vacuum breakers shall be full size of line feed. All hose bibbs shall be supplied with vacuum breakers attached to hose thread portion of hose bibb unless they are integral to fixture.
3. Hose bibbs shall be equal to the following:
   a. (Toilet Rooms) Chicago No. 952 (2 in.)
   b. (Mechanical Rooms) Chicago No. 998 (3/4 in.)
   c. (Exterior wall hydrants) J.R. Smith No. 5610
4. Shock absorbers shall be of the mechanical, pre pressurized type installed where indicated and in accordance with "Standard P.D.I. WH201."
5. Combined Pressure Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 deg F, and pressure relief at 150 psi.
6. Pressure Regulating Valves: Single seated, direct operated type; having bronze body with integral strainer, and complying with requirements of ASSE Standard 1003. Select proper size for maximum flow rate and inlet and outlet pressures indicated.
7. Relief Valves: Provide proper size for relief valve, in accordance with ASME Boiler and Pressure Vessel Codes, for indicated capacity of the appliance.
8. Water meter: Compound type, conforming to AWWA Standards. Size meter and arrange piping and specialties to comply with utility company requirements.

2.3 HANGERS AND ACCESSORIES

A. General

1. Provide pipe stands, supports, hangers and other supporting appliances as necessary to support work required by Contract Documents. All components of the hanger support system shall comply with the standards set forth in MSS-SP58 and MSS-SP69 (Manufacturers Standardization Society) latest publication.
2. Manufacturers: Subject to compliance with requirements, provide hangers and supports of Carpenter and Patterson, Inc, ITT Grinnel Corp., Elecen Metal Products or approved equal.

B. Secure vertical piping to building construction to prevent sagging or swinging.

C. Space hangers for horizontal piping as follows:

Pipe Size	Rod Diameter	Maximum Spacing
2 and 3/4 A	3/8 in.	6 ft.- 0 in.
1 in. and 1-1/4 in.	3/8 in.	8 ft.-0 in.
1-1/2 and 2 in.	3/8 in.	10 ft.-0 in.
2-1/2 and 3 in.	2 in.	10 ft.-0 in.
4 and 5 in.	5/8 in.	12 ft.-0 in.
6 in.	3/4 in.	12 ft.-0 in.

8 in. and over	7/8 in.	12 ft.-0 in.

D. Friction clamps shall be equal to Figures 126 and copper plated when in direct contact with copper or brass piping.

E. Hangers for uncovered (uninsulated) copper or brass piping 2 in. and smaller shall be Carpenter & Patterson Figure 1ACT steel, copper plated band type.

F. Hangers for uncovered (uninsulated) steel or cast iron piping 2 in. and smaller shall be Carpenter & Patterson Figure 1A steel band type.

G. Hangers for uncovered (uninsulated) steel or cast iron piping 2-1/2 in. and larger shall be Carpenter & Patterson Figure 100 steel clevis type.

H. Hangers for all insulated piping shall be Carpenter & Patterson Figure 100 steel clevis type with insulation shield specified below.

I. Hangers for uncovered (uninsulated) copper or brass piping 2-1/2 in. and larger shall be factory applied copper plated steel clevis hangers, Carpenter & Patterson Fig. 100 CT. Rods and nuts used with these hangers shall also be factory applied copper plated.

J. Where three or more pipes are running parallel to each other, factory fabricated gang type hangers with pipe saddle clips, or rollers may be used in lieu of the hereinbefore specified Clevis hangers. These hangers shall be sized to provide for insulation protectors as hereinafter specified. Pipe saddle clips shall be not less than 16 gauge metal and shall be copper when installed with uninsulated copper piping. Where pipe rollers are provided for uninsulated copper or brass piping, insulation protectors shall be provided at each set of rollers and filled with a section of heavy density fiberglass pipe covering specified hereinafter. (Refer to insulation of this specification.) Fig. 342 sized to suit loading with hanger rods and nuts.

K. Extension type split ring hangers with wall plates shall be equal to Carpenter & Patterson Figures 81, 81 CT, 90 CT and 85, 85 CT plates for iron, steel and copper.

L. Hanger rods for other installations shall be sized in accordance with the recommended load capacities of ASTM Specifications Designation A 107, latest amendment.

M. Insulation protectors (shields) for horizontal piping shall be constructed of galvanized steel formed to a 180 degree arc and 12 inches long, equal to Carpenter & Patterson Figure 265P, 18 gauge type H for hangers 5 inches in size and smaller, 16 gauge for hangers larger than 5 inches in size.

N. Exposed rods, clamps and hangers shall be electrogalvanized coated.

O. Installation of hangers which permit wide lateral motions of any pipe will not be acceptable.

P. "C" clamps installed with pipe hangers or equipment hangers will not be permitted unless provided with retaining straps.

Q. All no-hub cast iron pipe 6 inches or larger in diameter shall be braced to prevent horizontal movement as required by code and recommended by the Cast Iron Soil Pipe Institute by using

braces, blocking or rodding as illustrated in the CISPI Handbook, Vol. II, Specification Section 310-78.

2.4 INSERTS AND ESCUTCHEONS

A. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4 inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 2 inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooked ends to allow fastening to reinforcing rods.

B. Unless otherwise specified herein, escutcheons shall be cast brass chrome plated type and provided with a set screw to properly hold escutcheon in place.

2.5 PIPE COVERING

A. General

1. The pipe covering specified herein for piping system shall be provided to strict accordance with the manufacturer's printed instructions, the best practice of the trade and to the full intent of this Specification.
2. Flame/Smoke Ratings: Provide complete fibrous glass pipe insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
3. Manufacturer: Subject to compliance with requirements, provide products of Armstrong World Industries, Inc., Knauf Fiber-Glass, Owens Corning or approved equal.
4. Apply insulation after systems have been tested, proved tight and approved by Designer. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.
5. No leaks in vapor barrier or voids in insulation will be accepted.
6. Insulation and vapor barrier on piping which passes through walls or partitions shall pass continuously through sleeve, except that piping between floors and through fire walls or smoke partitions shall have space allowed for application of approved packing between sleeves and ping, to provide firestop as required by NFPA. Seal ends to provide continuous vapor barrier where insulation is interrupted.

2.6 CLEANOUTS

A. Cleanouts shall be Jay R. Smith, Josam, Zurn or approved equal.

B. Bodies of cleanout ferules in hub and spigot or no hub piping shall be standard pipe size conforming in thickness to that required for pipe and fittings, and shall extend not less than 3/4 inch above the hub of the pipe. The cleanout plug shall be of cast brass and shall be provided with a raised nut 3/4 inch high. Cleanouts in copper waste piping shall be soldered brass cleanout fittings with extra heavy brass screw plugs of the same size as the pipe line. Cleanouts in threaded waste piping shall be cast iron drainage "T" pattern 90 degree branch fittings with extra heavy brass screw plugs of the same size as the pipe.

C. Floor cleanouts shall be as follows:

1. General purpose flush finished floor cleanout with adjustable top shall be equal to Jay R. Smith Series 4026.
2. Wall cleanout with cleanout tee and square frame and cover shall be equal to Jay R. Smith Series 4558.

2.7 PLUMBING FIXTURES

A. In general, the work of this Article shall include, but not be limited to:

1. Plumbing fixtures and trim.
2. Faucets and flushometers.
3. Stops and supplies.
4. Traps and tailpieces.
5. Drain outlets.

B. Fixtures and Trim

1. Acceptable Manufacturers: Submit manufacturers not listed below for review and approval as specified for substitutions in Article Quality Assurance in this Section.
   a. Stops and Supplies: Chicago Faucet Co., Kohler or McGuire.
   b. P-Traps: McGuire, Sanitary-Dash, or Jameco.
2. P-Traps: Cast brass adjustable P-trap with cleanout plug, ground joint and 17 gage minimum weight extension with escutcheon.
   a. Provide McGuire No. 8090 1-1/4 inch by 1-1/2 inch on lavatories.
   b. Provide McGuire No. 8089 1-1/2 inch by 1-1/2 inch on sinks.
3. Stops and Supplies: Provide stops and supplies of the same manufacturer as the fixture or faucet trim, or provide McGuire Model 170-LK loose key angle stop with 5 inch long 2 inch nominal copper sweat extension, bell escutcheon, and 3/8 inch O.D. by 12 inch flexible riser.

2.8 EQUIPMENT PROVIDED UNDER OTHER SECTIONS OR BY DCAMM

A. Provide roughing and final connections for water, waste, vent and gas systems, including traps, tailpiece and strainers, wheel handle stops, valves, cocks and appurtenances furnished under other Sections or by User Agency as required. Provide valves and traps for fixtures and equipment, including work in, under and through tables, cabinets and equipment chases.

B. Equipment may vary from that indicated. Rearrangement of equipment from Drawings may be required. Make connections to rearranged equipment as part of work of this Section. Unpack, assemble and install supply trim for fixtures and equipment furnished under other Sections or by User Agency.

C. Provide miscellaneous equipment connections and indirect drains from fixtures and equipment. Provide unions at kitchen equipment and where necessary for disconnection of piping for maintenance.

D. Roughing shall not be undertaken until Designer has approved fixture and equipment shop drawings and template is furnished by pertinent manufacturer so that connecting requirements may be verified and work installed in neat and workmanlike manner. Exact location of service connections shall be obtained prior to roughing.

E. Provide shock absorbers with quick closing valves. Provide shut-off valves beneath absorbers. Absorbers shall be sized as required by Plumbing and Drainage Institute Standard PDI-WH 201.

F. Hook-up between garbage disposer and cold-water branch shall include gate valve, solenoid valve and vacuum breaker for garbage disposer and cold-water branch.

G. Provide shutoff valves on fixture and equipment supplies.

H. Provide vacuum breakers in conjunction with water lines to booster, garbage disposal and dishwasher and where required to prevent polluted back siphoning.

I. All connections and piping within the kitchen shall be made with chrome plated IPS brass with CPB fittings or stainless steel with all stainless fittings.

2.9 FIRESTOPPING

A. Work of Section 078413 – PENETRATION FIRESTOPPING.

2.10 SLEEVES AND PENETRATIONS

A. Piping penetrations through fire rated construction shall comply with a listed fire rated assembly as detailed in the UL Fire Resistance Directory. Pipe sleeves through floors, exterior walls and fire-rated construction shall be galvanized Schedule 40 steel pipe. Pipe sleeves through non-fire-rated partitions shall be 26 gauge-galvanized steel.

1. In areas where pipe is exposed, install sleeves flush with the finish floor, except in mechanical rooms, and janitor's closets extend sleeves at least 4 inches above finish floor.
2. Annular Space Requirements: Sleeves shall be sized to provide a total clearance of approximately 1 inch around pipe including insulation cover. Annular space around fire rated through penetrations assemblies shall be in compliance with the Listed Assembly.
3. Packing between the pipe and sleeve in fire rated construction shall be a combination of listed insulation and fireproof caulk.

B. Where piping passes below grade beams and footings, provide a ductile iron sleeve three sizes larger than the pipe being served. Sleeve shall be a minimum of six feet in length.

2.11 VALVE TAGS

A. Upon completion of piping installation work provide valve tags on all valves installed under the work of the mechanical sections. Valve tags shall be at least 1-1/2 inch diameter brass or engraved plastic with 1/4 inch high lettering for service designation over 2 inch high consecutively numbered valve identification. Engraved valve tags shall be color coded as

specified for piping identification. Coordinate valve tag numbers with the User Agency's facility management program. Provide service designation prefix as scheduled:

		Prefix:
1.	Plumbing Systems:	
a.	Domestic Cold Water	CW
b.	Domestic Hot Water	HW
c.	Domestic Hot Water Circulation	HWC
d.	Normally Closed	NC

B. Valve tags on plumbing systems may be engraved laminated plastic tags color-coded to match the pipe identification marks.

2.12 PIPING IDENTIFICATION

A. Piping: Provide clip-on color-coded piping identification markers on piping systems. Provide matching flow arrows to indicate direction of flow. Markers shall be equal to Seton Setmark. Pipe marking for outside diameters of 6 inches or greater may be springs or metal bands secured to the corners at each end of the semi-rigid plastic marker to hold each end of the marker firmly against the pipe.

1. Color coding and size of legend letters shall comply with the standards of ANSI A13.1.

2. Provide markers with legend letters sized in compliance with the following schedule:

Outside Diameter (Over Insulation)	Size of Letters:	Length of Color Code:
1-1/4 inch and smaller	2 inch	8 inches
1-1/2 inch to 2 inch	3/4 inch	8 inches
2-1/2 inches to 6 inches	1-1/4 inch	12 inches
8 inch	2-1/2 inch	24 inches
10 inch and larger	3-1/2 inch	32 inches

3. Plumbing Systems: Provide color-coded identification markers in compliance with the following schedule with contrasting legend letters.

Service	Identification	Color Code
Cold Water	Dom. Cold Water	Green
Hot Water	Dom. Hot Water	Green
Hot Water Return	Dom. Hot Water Return	Green
Soil or Waste	Sanitary	Yellow
Vent	Plumbing Vent	Yellow

PART 3 - EXECUTION

3.1 IDENTIFICATION

A. All equipment and each length of pipe fitting, trap, fixture, control panel, starter and device used in the systems shall have a permanently attached nameplate or be cast, stamped or indelibly marked with the manufacturer's mark or name, the weight, type and class. The nameplates shall be kept clean and readable at all times.

B. Painting

1. Finished field painting of designated plumbing works shall be performed under Section 099000 – PAINTING AND COATING.
2. All unpainted, non insulated, non galvanized, ferrous metal surfaces only of conduits, pipes, equipment, hangers, supports, accessories, and so forth, furnished and installed by this Subcontractor, shall be painted as follows by this Subcontractor. Concealed and Exposed one prime coat of metal primer. Underground two coats of black asphaltum paint.
3. Surfaces which will be inaccessible for painting after installation shall be painted before installation.
4. Surfaces to be painted shall be thoroughly cleaned of all scale, rust, dirt, oil and other foreign matter and shall be completely dry before applying paint.
5. After installation, equipment and accessories with factory primed or finished surfaces shall be cleaned, and bare or marred spots refinished and/or touched up by each Subcontractor with the same type paint and process as applied at the factory.
6. Nameplates on all equipment shall be cleaned and left free of paint.
7. Materials and workmanship shall be equal to the requirements specified under Section 099000 – PAINTING AND COATING.

3.2 CROSS CONNECTION PROTECTION AND APPROVALS

A. Protect potable water piping outlets and connections to equipment or machinery against backflow with an air-gap or approved backflow preventer.

B. Prior to installation, the Contractor shall submit through DCAMM’s Project Manager, a design data sheet, with plans showing the method of protecting the water system, and secure approval from the (cross connection control division) local water authority, or its designee. This shall not be done until the Contractor has secured the plumbing permit for the work, by the Inspector of Plumbing, and shop drawings have been reviewed.

3.3 DISINFECTION, CLEANING AND ADJUSTING

A. Disinfection

1. Each potable water system (cold and hot water) shall be cleaned and disinfected by this Contractor. Cleaning and disinfection shall be performed after all pipes, valves, fixtures and other components of the systems are installed, tested and ready for operation.

2. All hot and cold water piping shall be thoroughly flushed with clean potable water, prior to disinfection, to remove dirt and other contaminants. Screens of faucets shall be removed before flushing and re installed after completion of disinfection.
3. Disinfection shall be done using sodium hypochlorite in the following manner:
   a. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into and through the system from this cock only.
   b. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, flow of disinfecting agent into main water supply is not permitted.
   c. All sectional valves shall be opened during disinfection. All outlets shall be fully opened at least twice during injection and the residual checked with orthotolidin solution.
   d. When the chlorine residual concentration, calculated on the volume of water the piping will contain indicated not less than 50 ppm (parts per million) at all outlets, then all valves shall be closed and secured.
   e. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.
   f. After the retention, the residual shall be not less than five parts per million. If less, then the process shall be repeated as described above.
   g. If satisfactory, then all fixtures shall be flushed with clean potable water until residual chlorine by orthotolidin tests shall be not greater than the incoming water supply. (This may be zero.)
4. All work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience. Certification of performance shall indicate:
   a. Name and location of the job and date when disinfection was performed.
   b. Material used for disinfection.
   c. Retention period of disinfectant in piping system.
   d. ppm chlorine during retention.
   e. ppm chlorine after flushing.
   f. Statement that disinfection was performed as specified.
   g. Signature and address of company or person performing disinfection.
5. Upon completion of final flushing (after retention period) the plumbing subcontractor shall obtain a minimum of one water sample from each hot and cold water line and submit samples to a State approved laboratory. Samples shall be taken from faucets located at highest floor and furthest from meter or main water supply. The laboratory report shall show the following:
   a. Name and address of approved laboratory testing the samples.
   b. Name and location of job and date the samples were obtained.
   c. The coliform organism count. (An acceptable test shall show the absence of coliform organisms.)
6. If analysis does not satisfy the above minimum requirements, the disinfection procedure shall be repeated.
7. Before acceptance of the systems, this Contractor shall submit to DCAMM's Project Manager for his review, three (3) copies of Certification of Performance as specified above.
8. Under no circumstances shall this contractor permit the use of any portion of domestic water systems until properly disinfected, flushed and certified.

B. Cleaning and Adjusting

1. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by operation of the system for testing.
2. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishings due to the Plumbing sub contractor's failure to properly clean the piping system shall be repaired by this Contractor at no increase in Contract costs.
3. At the completion of the work, all water systems shall be adjusted for quiet operation.
4. All automatic control devices shall be adjusted for proper operation.
5. All plumbing fixtures and exposed metal work shall be cleaned and polished. Floor drain strainers and traps shall be cleaned of all debris.
6. All items of equipment shall be thoroughly inspected. Any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match the original finish. All items so repaired and refinished shall be brought to the attention of the Designer and DCAMM's Project Manager for inspection and approval.

3.4 SYSTEMS

A. Sanitary Waste

1. The Plumbing subcontractor shall be responsible for checking each pipe for alignment, center line elevation and invert grade for underground installations.
2. At times when work is not in progress, open ends of pipe and fittings shall be securely closed to the satisfaction of the Project Manager so that no trench water, earth or other substance will enter the pipe or fittings. Any section of a building drainage system that is found defective in material, alignment, grade or joints before acceptance shall be corrected to the satisfaction of DCAMM's Project Manager. Pipe laid through rock excavation shall rest on a six inch layer of well compacted sand.
3. The sanitary (soil, waste and vent), storm and basement drainage piping three inches and smaller in diameter shall pitch a minimum of 1/4 inch per foot. Piping four inches and larger in diameter shall pitch a minimum of 1/8 inch per foot.
4. The soil, waste and vent stacks shall be connected as shown and extended through the roof a minimum of 18 inches. Soil, waste and vent pipes shall be concealed unless otherwise noted.
5. Branch connections to each drainage system shall be made with "Wye" and long turn "Tee Wye" fittings. Installation of short radius 1/4 bends, common off sets, double hub fittings and saddles will not be approved. Installation of short "Tee Wye" fittings will be permitted for vertical piping only, and only where space conditions will not permit the use of long turn fittings. Only fittings conforming to the Code shall be installed.
6. The changes in direction of each drainage system shall be made with "Wye" branches and 1/8 bends. Provide long sweep bends at bottom of stacks with a vertical cleanout just above the floor at places where a "Wye" and 1/8 bends and end cleanouts cannot be installed.
7. Every fixture shall be separately trapped and the traps must be vented unless an approved battery vented system is being installed. Floor drains shall be considered as a fixture.
8. Vents shall be connected to the discharge of each trap in the sanitary system, thence carried individually to a point above the flood level of the fixture before connecting with any other vent pipes. Pitch the branch vents back to the fixture.

9. Collect individual vent pipes together in branch vent lines and connect to vent stacks. Wherever possible, vent stack offsets shall be made with 45 degree fittings. The vents passing through the roof shall be a minimum size of four inches in diameter.
10. Cleanouts shall be provided in drainage piping at changes in directions, at foot of stacks or other required points accessible for cleaning or rodding out.
11. Cleanouts shall be of the same size as the pipe installed in up to four inches in diameter and not less than four inches in diameter for piping larger than four inches in diameter.
12. The maximum horizontal distance between cleanouts in piping four inches in diameter and smaller shall not be more than 50 feet apart. In piping five inches in diameter and larger, cleanouts shall not be more than 100 feet apart.
13. Traps on sanitary piping not integral with fixtures and in accessible locations shall be provided with a brass trap screw protected by the water seal, and will be regarded as a cleanout.
14. Test tees with brass cleanout plugs shall be provided at the foot of all vertical soil, waste and storm drainage stacks and at each floor. Wherever cleanouts on vertical lines occur concealed behind finished walls, they shall be extended to back of finished wall, and a wall plate shall be provided.

B. Cold and Hot Water Piping (Including Non-Potable Cold Water)

1. Vacuum breakers shall be installed on supplies to each piece of equipment to prevent back siphonage.
2. Branch lines from water service or main lines shall be taken off the top or bottom of main, using such crossover fittings as may be required by structural or installation conditions. All water service pipes, fittings, and valves shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between coverings on the different services.
3. Provide shock absorbers at special equipment, tops of the risers, at each individual or each group of fixtures.
4. Water piping shall be run parallel and graded evenly to the drainage points. There shall be a 2 inch drain valve provided for each low point in the piping so that all parts of each water system can be drawn off.
5. Provide suitable means of thermal expansion for the hot water piping using swing joints, expansion loops and long turn offsets as required to suit building conditions.
6. Piping connections to equipment shall be provided with unions or flanges to permit convenient disassembly for alterations and repairs.
7. No piping shall be installed in a manner to permit back siphonage or any flow of water from sanitary or drainage systems into the water systems or their distribution piping under any conditions.
8. Air gaps, open end of funnel drains, and approved vacuum breaking devices shall be provided as specified or as indicated on the Drawings. Piping to hose end faucets or hose end fittings, or any fixtures where water supply outlet is below the fixture overflow rim shall have vacuum breakers.
9. Where flanges are installed in the water systems, red rubber gaskets shall be installed between each pair of flanges.
10. Heating or bending of copper tubing to eliminate the installation of fittings will not be permitted.
11. Piping systems shall be kept clean during all phases of work. Open ends of incomplete piping shall be protected to prevent the entrance of foreign materials.

12. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.
13. Provide copper plated friction clamps on the old water supplies to each water closet and urinal flushometer. Friction clamp shall be firmly clamped to the pipe and shall be firmly attached to the adjacent wall structure.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. Piping Installation

1. Install piping approximately as shown on the drawings and as directed during installation by the Designer's representative.
2. Piping shall be installed as straight and direct as possible, forming right angles or parallel lines with building walls, other piping and be neatly spaced.
3. The horizontal runs of piping, except where concealed in partitions, shall be installed as high as possible.
4. Piping or other apparatus shall not be installed in such a manner as to interfere with the full swing of the doors and access to other equipment.
5. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the Drawings shall be followed as closely as possible.
6. It shall be possible to drain the water from all sections of each cold and hot water piping system. Pitch piping back to drain valves.
7. Screwed piping of brass or chrome plated brass shall be made up with special care to avoid marring or damaging pipe and fitting exterior and interior surfaces.
8. Small fittings shall be taper thread. Lampwick, cord, wool or any other similar material shall not be used to make up thread joints.
9. Screwed pipe and copper tubing shall be reamed smooth before installation.
10. All exposed piping in connection with fixtures shall be chrome plated. Where chrome plated piping is installed, cut and thread pipe so that no unplated pipe threads are visible when work is completed.
11. Reducing fittings, unless otherwise approved in special cases, shall be provided in making reduction in size of pipe. Bushings will not be allowed unless specifically approved.
12. Remove and replace with new materials, any copper or brass piping (chrome plated or unplated) showing visible tool marks.
13. Vertical risers shall be firmly supported by riser clamps, properly installed to relieve all weight from the fittings.
14. Any piece of pipe six inches or less in length shall be considered as a nipple.
15. All water service piping shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between the coverings (insulation) on the different services.

B. Hanger Installation

1. All piping shall be supported from the building structure by means of approved hangers and supports, to maintain proper grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.

a. Maximum spacing of hangers on soil pipe shall be five feet and hangers shall be provided at all changes in direction. Vertical hanger rods to support piping from the structure or supplementary steel shall not exceed four feet in total length. Where pipe support assemblies exceed four feet in total length vertically, this Contractor shall provide factory fabricated channels and all associated accessories.
b. Friction clamps shall be installed at the base of the plumbing risers and at each floor (above or below floor slabs). Friction clamps installed above floor slabs shall not be supported from or rest on floor sleeves.
c. Provide hangers at a maximum distance of two feet from all changes in direction (horizontal and vertical) and on both sides of concentrated loads independent of the piping.
d. Hangers, in general, for all horizontal piping shall be Clevis type hangers. These hangers shall be sized to fit the outside diameter of the pipe insulation and insulation protectors (sheet metal shields) specified herein. For sprinkler/stand pipe systems, hanger shall be approved black malleable iron, heavy duty pattern having two (2) parts bolted together.
e. All vertical drops and runouts including insulated pipes shall be supported by split ring hangers with extension rods and wall plates. These hangers shall be copper plated when used on uncovered copper tubing. Supports on insulated vertical piping shall be sized to fit the outside diameter of the pipe insulation with 360 degrees insulation protector.
f. Provide on each horizontal insulated lines, pipe covering protectors (shields) at each hanger. Each protector shall be sized to fit the outside diameter of the pipe insulation.
g. Retaining straps shall be provided with all beam clamps.
h. All supplementary steel, including factory fabricated channels, associated accessories, and 12 inch long sheet metal shields, throughout the project for this Section of the Specifications, both suspended and floor mounted, shall be provided by this Contractor and shall be subject to the approval of the Engineer.
i. Hangers shall not pierce the insulation on any insulated pipe.
j. Wire, tape or wood fastenings for shims or support of any pipe or tubing shall not be used.
k. Remove all rust from the ferrous hanger equipment (hangers, rods, and bolts) and apply one coat of red lead immediately after erection.
l. Piping at all equipment and each control valve shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping at equipment shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.
m. All piping shall be independently supported from the building structure and not from the piping, ductwork, conduit or ceiling suspension systems of other systems.
n. Installation of hangers which permit wide lateral motions of any pipe will not be acceptable.
o. "C" clamps installed with pipe hangers or equipment hangers will not be permitted unless provided with retaining straps.
p. All no hub cast iron pipe 6 inches or larger in diameter shall be braced to prevent horizontal movement as recommended by the Cast Iron Soil Pipe Institute by using braces, blocking or rodding as illustrated in the CISPI Handbook, Vol. II, Specification Section 310.

C. Pipe Covering Installation

1. Before pipe covering is applied, all pressure tests shall have been performed and approved by the Local Plumbing Inspector.
2. Pipe covering shall be applied over clean, dry surfaces.
3. Pipe covering shall be continuous and shall be carefully fitted with side and end joints butted firmly and tightly together and finished as specified herein.
4. Pipe covering and auxiliaries shall be kept dry during storage and application.
5. Adhesives, cements and coatings shall not be applied when the ambient temperature is below 40 degrees Fahrenheit.
6. Valve bodies shall have covering applied up to the stem.
7. It is the intent of this Specification that all vapor barriers be sealed and be continuous throughout. Staples shall not be used on vapor barrier jackets.
8. Where pipe covering ends occur at equipment or fixtures, end caps on the covering shall be provided.
9. Adequate operating clearances shall be provided at control mechanisms.
10. Pipe covering for flanges shall overlap the adjoining pipe by a minimum of three inches on each side.
11. Pipe covering shall be provided on all piping passing through ceilings and through the interior above ground sleeves (wall and floor).
12. All voids and seams in insulation shall be filled with insulating cement and finished as specified herein.
13. End joints of each section of the installed pipe covering shall be tightly butted.

D. Installation of Sleeves, Inserts and Escutcheons

1. Sleeves in floors shall be set 1 inch above the finished floor surface or as indicated on the Architectural Drawings.
2. Sleeves through interior masonry or non masonry walls or partitions shall be set flush with the finished surfaces of the wall or partition.
3. Field drilling for inserts required for work under this Section of the Specifications shall be provided by this Contractor.
4. Each interior wall or partition sleeve shall be packed with foam or glass wool to within one inch of each face of wall, and the remaining portion of each end of sleeve to be sealed with U.L. listed fire proof caulking compound equal to the rating of the partition.
5. Escutcheons shall be installed around all exposed insulated or bare pipe, except water closet starts or bends passing through a finished floor, wall or ceiling. Escutcheons shall fit snugly around the bare pipe or insulated pipe.

E. Valve Installation

1. Location of Valves: There shall be valves where indicated on the drawings and where specified as follows:
    a. At building service entrances, foot of all supply risers, branches to groups of fixtures, branches to separate fixtures, equipment, wall hydrants, hose bibbs, connections to other systems and sectionalizing points in each system.
    b. Each fixture supply shall have a separate angle stop or straight stop finished like the pipe it services.
    c. Each piece of equipment shall have isolation valves for each service connected.
    d. At the foot of each riser, on the inlet and outlet side of control valves.

e. At the low points of each water system including trapped sections, provide a tee with 2 inch branch and valve with 3/4 inch hose end adapter and attached chain with cap.
f. Valves shall be located to permit easy operation, replacement or repair.

F. Grease Trap Installation

1. Grease traps shall be located so as to provide working access to the secured cover.
2. In order to insure maximum efficiency a flow control fitting shall be provided on the inlet drain to insure that the flow does not exceed the maximum rating of the grease trap.
3. Each grease trap shall be installed in accordance with the manufacturers written installation instructions.

G. Installation of Cleanouts and Ferrules

1. Riser Connection to Sewer or Drain: Where soil, waste, or roof drainage risers connect to a sewer or drain extending from the building above the lowest floor, the fitting at the base of each stack or downspout shall be a sanitary tee or a combination Y and 1/8 bend with cleanout plug in the end of the run of the main.
2. Test Tees: Each vertical soil, waste, and vent pipe and each downspout and roof drainage pipe which connects to horizontal drain piping below ground shall be fitted with a test tee above the lowest floor or ground. Where accessible, test tee may be installed in the horizontal pipe at the base of the riser.
3. Cover Plates: Where cleanouts or test tees occur on concealed pipes in finished rooms, they shall be provided with a 1/8 inch thick, machine finished, brass cover plate of sufficient diameter to cover the opening in the finished wall or partition. The cleanout plug shall have a solid head, tapped for a 1/4 inch brass screw to secure the cover plate. Where cleanout plugs extend beyond the wall finish, the cover plates shall be of machine finished brass and shall be only of sufficient depth to fit against the wall to cover plug. Cleanout cover plates shall be painted to match adjacent wall finish.
4. Cleanouts Plugs For Threaded Fittings: Cleanout plugs for threaded fittings shall be in accordance with ANSI B16.12. Except for test openings, where size must be sufficient to admit test plug, bushings will be permitted on pipes 5 inches and larger to reduce plug size to 4 inches; cleanout plugs for piping 4 inches and smaller shall be the same size as the pipe.
5. Cleanout Plugs For Hub and Spigot Fittings: Cleanout plugs for hub and spigot fittings shall be screwed into ferrules caulked into the fitting. Ferrules and plugs shall be in accordance with ANSI B16.12, except that plugs required to be flush with the floor shall have square countersunk heads in lieu of raised heads.
6. Cleanout Plugs For Copper Drainage Lines: Cleanout plugs on copper drainage lines shall be installed in solder joint fittings having threaded openings provided for the cleanout, or in solder joint fittings with threaded adapters.

H. Installation of Plumbing Fixtures

1. General:
   a. Refer to Architectural Drawings for locations and mounting heights of all plumbing fixtures, counter sinks, water fountains and showers.

b. Provide with all plumbing fixtures, all trim, supports, fittings, connections and all incidentals necessary to make a complete installation in accordance with plumbing codes and the Contract Documents.
c. All visible hanger nuts and all escutcheons shall likewise be chrome plated over nickel plate.

2. Examination:
   a. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.
   b. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
   c. Do not proceed until unsatisfactory conditions have been corrected.
3. Fixture Roughings
   a. Install rough plumbing including fixture carriers and supports, valves and water hammer arrestors within chase tolerances. Supply roughing through finish walls and at hose bibbs and shower heads shall be secure and free of movement. Locate valves and water hammer arrestors within 12 inches of approved access panel location.
   b. Align exposed waste and supply pipe roughings with fixture connections within 1 inch tolerance. Provide flush valves in alignment with the fixture, without vertical or horizontal offsets. Obtain fixture manufacturer roughing data sheets for recommended roughing dimensions.
   c. Provide fixture templates for casework contractor for counter mounted sinks and lavatories.
      1) Rough handicapped use water closets to locate the flush valve handle on the wide side of the toilet stall.
   d. Secure fixture supports to floor slab construction with lag bolts and metal expansion shields to support at least 250 pounds on the front rim of the fixture for 5 minutes.
   e. Provide fixture rough-in piping connections sizes in accordance with the following schedule:

	HW	CW	S or W
Water Closets	-	1 inch	4 inches
Lavatories	2 inch	2 inch	12 inches
Service Sinks	2 inch	2 inch	3 inches
Sinks	2 inch	2 inch	2 inches

4. Fixture Supports
   a. All fixtures (including drinking fountains) shall be supported and fastened to the building structure. The method of support for each type fixture shall be specified herein, except when the fixture designations on the Contract Drawings indicate modifications.
   b. Wall hung water closets shall be generally supported on combination drainage fittings and chair carriers and with foot supports fastened to the floor slab with expansion lag screws.
   c. Urinals shall be supported by floor mounted carrier with support plate, bearing plate, adjustable extension, tubular uprights, block bases and chrome plated trim.

d. Installations shall be complete with all necessary bolts, nuts and washers, iron or brass connecting nipples between fixtures and piping system of the proper length and graphite non-asbestos gaskets for closet connections.
e. Where wall hung fixtures are secured to masonry walls or partitions, they shall be fastened with 1/4 inch through bolts provided with nuts and washers at back. Bolt heads and nuts shall be hexagon and exposed bolts, nuts, washers and screws shall be chromium plated brass.
f. Where secured to concrete or brick walls, they shall be fastened with brass bolts or machine screws in lead sleeve type expansion shields and shall extend at least three inches into solid concrete or brick work, except fixtures specified to be supported or chair carriers.

5. Installation of Fixtures
   a. Mount fixtures level at elevations shown on architectural drawings. Refer to toilet room elevations and casework details.
   b. Install handicapped use fixtures in accordance with the requirements to the Architectural Access Board Code and ANSI A117.1. Insulate hot water supply and waste piping under lavatories.
      1) Where urinals are provided: Install one urinal with the rim mounted 15 inches above the finish floor in compliance with the handicapped code.
   c. Grout wall and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.
   d. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.
6. Fixture Trim:
   a. All materials specified to be chromium plated shall be thoroughly cleaned and polished before plating, and plate shall be heavily, thoroughly and evenly applied, guaranteed not to strip or peel.
   b. Where escutcheons are not furnished with plumbing fixtures, this Contractor shall supply them. Escutcheons shall be the type and material specified herein.
   c. Each fixture shall be separately trapped using the type and size of trap specified herein and required by the Plumbing Code.
   d. Unless otherwise specified, faucets and all exposed fittings shall be chromium plated. Chromium plating for brass shall be applied on a first plating of nickel.
   e. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of the fixture.
   f. All brass shall conform to brass tubing and shall be not less than No. 17 gauge.
7. Adjustments and Cleaning
   a. After completion of the installation work and equipment start-ups, perform the necessary adjustments to systems installed under this Section. Submit verification that systems are operating at the specified temperatures and pressures.
   b. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
   c. Operate and adjust disposers, hot water dispensers, and controls. Replace damaged and malfunctioning units and controls.
   d. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.
   e. Replace washers of leaking and dripping faucets and stops.
   f. Adjust flush valves, open fixture stops, and clean faucet aerators.

g. Set aquastats on water heaters and circulation pumps.
h. Adjust metering faucets to deliver a maximum of 1/4 gallon of hot water at a rate of 2 gpm and operate for at least 10 seconds upon activation.
i. Temperature adjustments: Adjust pressure balanced mixing valves serving pot sink to provide a minimum temperature of 140 degrees F. Adjust metering faucets at hand wash sinks to provide a maximum temperature of 110 degrees F.
j. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

8. Protection
   a. Provide protective covering for installed fixtures and fittings.
   b. Do not allow use of fixtures for temporary facilities, except when approved in writing by DCAMM's Project Manager.

3.6 INSPECTION AND TESTS

A. General

1. All labor, materials, instruments, devices and power required for testing shall be provided by the Plumbing Subcontractor. The tests shall be performed in the presence and to the satisfaction of the Designer and DCAMM's Project Manager and such other parties as may have legal jurisdiction. No piping in any location shall be closed up, furred in, or covered before testing and approval by the Local Plumbing Inspector and DCAMM's Project Manager.
2. Where portions of piping systems are to be covered or concealed before completion of the project, those portions shall be tested separately in the manner specified herein for the respective entire system.
3. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of DCAMM's Project Manager shall be retested in part or in whole as directed.
4. The Authority retains the right to request a recheck or resetting of any pump or instrument by the Plumbing Subcontractor during the guarantee period at no additional cost to the Contract or DCAMM.
5. Repair, or if directed by Designer or DCAMM's Project Manager, replace any defective work with new work without extra cost to DCAMM. Repeat tests as directed, until the work is proven to meet the requirements specified herein.
6. Restore to its finished condition any work, provided by other Contractors, damaged or disturbed by tests. The Plumbing Subcontractor shall engage the original Contractor to do the work of restoration to the damaged or disturbed work.
7. The fixtures shall be tested for stability of support and satisfactory operation. The piping shall be tested when directed by the Designer, Local Plumbing Inspector or DCAMM's Project Manager for stability of support.
8. After the fixtures are set and connected, and the piping systems to same have been tested, the Plumbing Subcontractor shall turn water on to the fixtures, equipment, fill the traps, etc., and the proper operation of all items shall be demonstrated by him in the presence of and to the satisfaction of the Designer, DCAMM's Project Manager, Plumbing Inspector, or their designated representative.
9. Caulking of screwed joints or holes in piping will not be acceptable.
10. The Plumbing Subcontractor shall notify the Designer, DCAMM's Project Manager and all inspectors having jurisdiction, a minimum of 48 hours in advance of making any

required tests so that arrangements may be made for their presence to witness scheduled tests.

B. Specific

1. Cold and Hot Water Piping System:
   a. Upon completion of the roughing in and before setting fixtures and final connections to all equipment, all water piping systems shall be tested to a hydrostatic pressure of 150 pounds per square inch.
   b. Each systems test shall be maintained for eight hours without a drop in pressure. These tests to be witnessed by Local Plumbing Inspector and DCAMM's Project Manager.
   c. After testing, provide complete adjustment of all parts of each water system until design distribution or balancing is obtained throughout.

3.7 COMMISSIONING OF EQUIPMENT AND SYSTEMS

A. The Designer will check the completed installation either sequentially as different parts are completed, or when the entire installation is complete, at the sole option of the Designer.

B. Prior to the Designer's checking a part of the installation or the entire installation, this contractor shall submit a letter signed by an officer of this contracting company or an officer of the Construction Manager stating that:

1. They are an officer of the company,
2. They have personally inspected the installation to be checked,
3. The date of his inspection,
4. The installation is complete and tested and ready to be inspected by the Designer, and that all required test reports have been submitted.

C. This contractor shall arrange that an officer of this contracting company or of the Construction Manager, as well as DCAMM's Project Manager, in addition to other test witnesses that may be specified, shall witness the below listed tests. At the conclusion of each such test this contractor shall submit a letter signed by the officer stating that:

1. They are an officer of the company,
2. They have personally witnessed the test (give the name of the test),
3. The date of testing,
4. The results of testing, as compared to specified performance,
5. listing the name, title, and company affiliation of all those witnessing the test.

3.8 SPECIAL RESPONSIBILITIES

A. Coordination: Cooperate and coordinate with work of other Sections in executing work of this Section.

1. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.

2. Provide information as requested on items furnished under this Section which shall be installed under other Sections.
3. Obtain detailed installation information from manufacturers of equipment provided under this Section.
4. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections or by User Agency.
5. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Designer.
6. Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor mounted vibrating and rotating equipment provided under this Section.
7. Notify Designer of location and extent of existing piping, ductwork and equipment that interferes with new construction. In coordination with and with approval of Designer, relocate piping, ductwork and equipment to permit new work to be provided as required by Contract Documents. Remove nonfunctioning and abandoned piping, ductwork and equipment as directed by Designer. Dispose of or store items as requested by Designer.

B. Installation Only Items

1. Where this contractor is required to install items which it does not purchase, it shall coordinate their delivery and be responsible for their unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This trade shall be responsible for:
   a. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
   b. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.
2. This Contractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of work of this contractor will be considered only if presented in writing within one week of their date of delivery. Unless such claims have been submitted this contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.

C. Maintenance of equipment and systems: Maintain HVAC, Plumbing and Fire Protection equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions. Do not use boilers before providing water treatment where required; this includes use of boilers for temporary heat or for testing.

D. Use of premises: Use of premises shall be restricted as directed by Designer and as required below.

1. Remove and dispose of dirt and debris, and keep premises reasonably clean. Upon completion of work, remove equipment and unused material. Put building and premises in neat and clean condition, and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Designer and as specified under CLEANING article.
2. It shall be this trade's responsibility to store his materials in a manner that will maintain an orderly clean appearance. If stored on site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.
3. Do not interfere with function of existing sewers and water and gas mains. Extreme care shall be observed to prevent debris from entering ductwork. Confer with Designer as to disruption of heating services or other utilities due to testing or connection of new work to existing. Interruption of heating services shall be performed at time of day or night deemed by Designer to provide minimal interference with normal operation. Obtain Designer's approval of the method proposed for minimizing service interruption.

E. Surveys and measurements:

1. Base measurements, both horizontal and vertical, on reference points established by Contractor and be responsible for correct laying out of work.
2. In event of discrepancy between actual measurements and those indicated, notify Designer in writing and do not proceed with work until written instructions have been issued by Designer.

3.9 MATERIALS AND WORKMANSHIP

A. Work shall be neat and rectilinear. Piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Install material and equipment as required by manufacturers. Installation shall operate safely and without leakage, undue wear, noise, vibration, corrosion or water hammer. Work shall be properly and effectively protected, and pipe openings shall be temporarily closed to prevent obstruction and damage before completion.

B. Except as specified otherwise, material and equipment shall be new. Provide supplies, appliances and connections necessary for complete and operational installation. Provide components required or recommended by OSHA and applicable NFPA documents.

C. References to manufacturers and to catalog designation, are intended to establish standards of quality for materials and performance but imply no further limitation of competitive bidding.

D. Finish of materials, components and equipment shall be as approved by Designer and shall be resistant to corrosion and weather as necessary.

E. DCAMM will not be responsible for material and equipment before testing and acceptance.

3.10 CONTINUITY OF SERVICES

A. Do not interrupt existing services without DCAMM’s Project Manager's approval.

B. Schedule interruptions in advance, according to DCAMM's Project Manager's instructions. Submit, in writing, with request for interruption, methods proposed to minimize length of interruption.

C. Interruptions shall be scheduled at such times of day and work so that they have minimal impact on User Agency's operations.

3.11 ANCHORS AND INSERTS

A. Inserts shall be iron or steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one horizontal direction and shall develop strength of bolt when installed in properly cured concrete.

B. Provide anchors as necessary for attachment of equipment supports and hangars.

3.12 INSTALLATION OF EQUIPMENT

A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways, to satisfaction of Designer and in accordance with code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.

B. Install equipment so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof mounted equipment shall be installed and supported on structural steel provided under other Sections.

C. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section (e.g. heating and ventilating units, fans, ducts and piping) as indicated on Drawings and in Specifications.

D. Provide steel supports and hardware for proper installation of hangers, anchors, guides, etc.

E. Provide cuts, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.

F. Structural steel and hardware shall conform to Standard Specifications of ASTM; use of steel and hardware shall conform to requirements of Section Five of Code of Practice of American Institute of Steel Construction.

G. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly which will void warrantee. Report in writing to Designer, prior to purchase or shipment of equipment involved, on conditions which may prevent proper installation.

3.13 SYSTEM SHUTDOWNS

A. Coordination shutdowns of existing systems with the DCAMM's Project Manager and submit a written request at least ten working days in advance. Minimize system shut downs as much as possible. Submit a list of all effected areas, the proposed work to be performed, and the expected length of the shut-down including time for retesting.

B. Provide temporary services to maintain active system during extended shut-downs as required for demolition and construction phasing.

3.14 CORE DRILLING

A. Coordinate locations for core drilling with the General Contractor.

B. Install sleeve in floor core as per details on drawings.

END OF SECTION 220001

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent:
1. Alcan Products Corporation; Alcan Cable Division.
2. Alpha Wire.
3. Belden Inc.
4. Encore Wire Corporation.
5. General Cable Technologies Corporation.
6. Southwire Incorporated.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-Type THHN-2-THWN-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for armored cable, Type AC, and metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent:
1. AFC Cable Systems, Inc.
2. Gardner Bender.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. Ilsco; a branch of Bardes Corporation.
6. NSi Industries LLC.
7. O-Z/Gedney; a brand of the EGS Electrical Group.
8. 3M; Electrical Markets Division.
9. Tyco Electronics.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Armored cable, Type AC Metal-clad cable, Type MC.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain-relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections]:
   1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
   2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:
   1. Procedures used.
   2. Results that comply with requirements.
   3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
   1. Ground rods.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

   1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning and Grounding.
7. ILSCO.
8. O-Z/Gedney; A Brand of the EGS Electrical Group.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

C. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

B. Prepare test and inspection reports.

C. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.

2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. Fabco Plastics Wholesale Limited.
d. Seasafe, Inc.

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as channels and angles.
4. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb .

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
2. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

3.3 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils .

B. Touchup: Comply with requirements in Section 099113 "Exterior Painting " Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Section 270000 "Telecommunications Infrastructure" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC IMC.
2. Concealed Conduit, Aboveground: GRC IMC.
3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R Type 4.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.

3. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel or nonmetallic in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: ¾ -inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. A. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to RNC, Type EPC-40-PVC, GRC or IMC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

U. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

V. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet . Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet .
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Set metal floor boxes level and flush with finished floor surface.

EE. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches,thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Company

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Presealed Systems

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Identification of power and control cables.
2. Identification for conductors.
3. Warning labels and signs.
4. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3. Insert names and wording of warning signs or labels; e.g., arc-flash, multiple services and voltages, and others.

2.4 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.

3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

END OF SECTION 260553

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Tamper-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Pendant cord-connector devices.

1.3 DEFINITIONS

A. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

2.3 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.4 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Key-Operated Switches, 120/277 V, 20 A:

1. Description: Single pole, with factory-supplied key in lieu of switch handle.

2.5 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Stainless Steel..
3. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

2.6 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Coordinate with architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.

7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. Using the test plug, verify that the device and its outlet box are securely mounted.
5. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Molded-case circuit breakers (MCCBs).

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Construction Manager's written permission.
4. Comply with NFPA 70E.

1.5 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MOLDED-CASE CIRCUIT BREAKERS

A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

C. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

D. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with 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 individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816